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ALASKA AGRICULTURAL EXPERIMENT STATIONS.
C. C. GEORGESON, Agronomist in Charge.

Under the supervision of the STATES RELATIONS SERVICE,
Office of Experiment Stations, U. S. Department of Agriculture.

REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS

1919

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Issued December 27, 1920

WASHINGTON
GOVERNMENT PRINTING OFFICE
1920

ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KODIAK, RAMPART, FAIRBANKS, AND MATANUSKA.

[Under the supervision of A. C. True, Director, States Relations Service, United States Department of Agriculture.]

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LETTER OF TRANSMITTAL.

Alaska Agricultural Experiment Stations,
Sitka, Alaska, March 22, 1920.

Sir: I have the honor to submit herewith a report of the work of the Alaska Agricultural Experiment Stations, 1919.

Very respectfully,

C. C. Georgeson,
Agronomist in Charge.

Dr. A. C. True,
Director, States Relations Service,
U. S. Department of Agriculture, Washington, D. C.

Publication recommended.
A. C. True, *Director.*

Publication authorized.
E. T. Meredith, *Secretary of Agriculture.*

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REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS, 1919.

SUMMARY OF WORK AT THE STATIONS.

By C. C. Georgeson, *Agronomist in Charge.*

No change in the policies or plans of work of the Alaska Experiment Stations occurred during the year 1919. The projects under way were thoroughly considered before they were adopted, and each of the many activities covered will be carried out until results are obtained from them. Some of the most important lines of work were the breeding and establishment of new varieties of grains, berries, fruits, and economic plants, and the raising of domestic animals of all kinds, for which there is great need in Alaska. Decided progress has already been made in these several branches of work, to which there is no limit. It may continue indefinitely and the chances for progress and improvement will increase rather than decrease with the development of the work. The experiment stations were established to aid in the development of an agricultural industry in Alaska, to take the lead in this work, and to disseminate information which will aid the settlers in their work. They were designed also to cooperate with the settlers in their pioneer work, to introduce, propagate, and distribute varieties of grain and seeds of all kinds which will help to advance agriculture.

COOPERATIVE WORK WITH SETTLERS.

As the work progresses it is becoming more and more apparent that the best aid which the stations can render in the development of agriculture is that of cooperating very closely with the settlers, practically all the pioneer farmers being newcomers. They have much to learn about the climate, methods of culture, and the things that can be best and most profitably grown. The stations have rendered excellent service in thus aiding farmers and will continue to do so.

The distribution of garden seed has been not only of very great value to the people but is very much appreciated by them. Alaska contains no seed houses and consequently all seed must be imported from the States. Months are required to obtain seed catalogues and to place orders, and in most cases the seed arrives when it is too late to plant. The seed so far distributed in Alaska has been generously supplied by the Bureau of Plant Industry of the United States Department of Agriculture. The experiment stations, as well as the settlers, express their gratitude for the liberal supplies of seed that the bureau has furnished.

There is, however, need for wider cooperation with the farmers. For the past three years it has been planned to maintain an official on the staff of the experiment stations whose duty it would be to visit the various settlements, study the problems needing solution in each location, hold meetings, advise with the farmers, give instructions, aid in the introduction and distribution of seeds, give advice regarding the erection of buildings and the purchase of implements and machinery, assist and counsel in the introduction of live stock, and in many other ways render the help needed by settlers unfamiliar with the conditions peculiar to Alaska, in order that their efforts might be attended with success. However, this plan has never been consummated because of lack of funds.

It has been demonstrated repeatedly that Alaska offers large agricultural possibilities. Encouragement should therefore be given settlers to take up homesteads in Alaska, and every possible aid should be afforded them after their arrival. This work is being done in a small way so far as the funds at the disposal of the stations will permit.

At present the largest farming settlement is in the neighborhood of Fairbanks in the Tanana Valley, where the Fairbanks Station is devoting a large share of its energy to aiding the farmers. M. D. Snodgrass, assistant in charge of the station, is especially well fitted for the cooperative work, as he not only understands the farmers but also has a thorough grasp of their problems. By frequently visiting their farms and by personal interest in and attention to their problems, Mr. Snodgrass has achieved very gratifying success in his work among the farmers of Fairbanks during the past year. About 5,000 bushels of grain was raised in the neighborhood of Fairbanks in 1919. It is desirable that this cooperative work should be extended to every farming settlement in Alaska. (Pl. I, fig. 1; Pl. XII.)

AID IN TESTING CATTLE FOR TUBERCULOSIS.

At the last session of the Territorial legislature an appropriation of $2,000 was made for testing all cattle for tuberculosis in the Territory. This appropriation was inadequate for the work, and the Alaska experiment stations aided the Territory by assigning B. C. Parker, a veterinarian attached to the Kodiak Station, to test these cattle in accordance with rules prescribed by law. Dr. Parker has visited every accessible settlement where cattle are kept. Work undertaken by him resulted in the condemnation and slaughter of a very large percentage of the cattle, especially in the dairy herds of

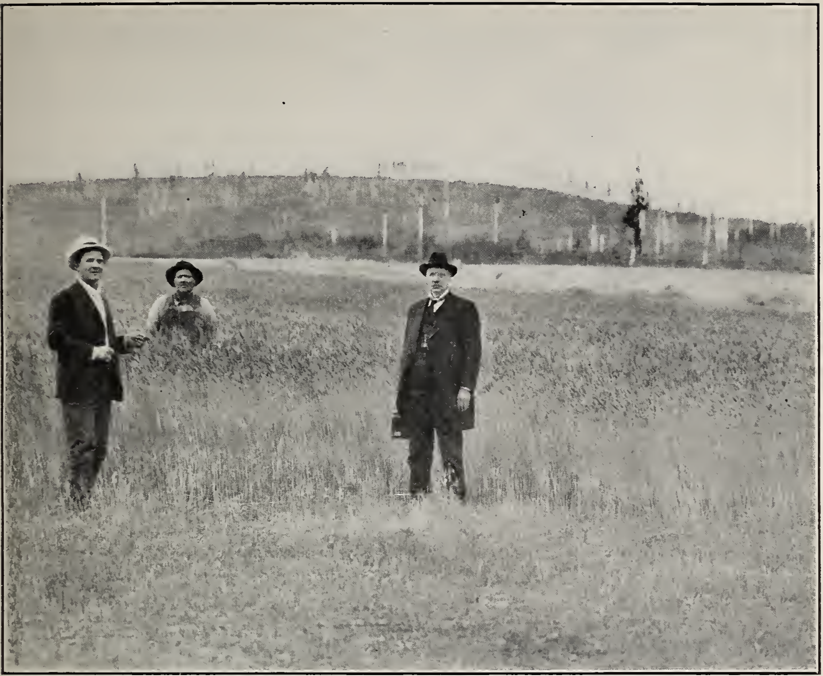


FIG. I.—WHEAT FIELD, J. D. MCINTYRE'S RANCH, NEAR FAIRBANKS. YIELD 20 BUSHELS PER ACRE.

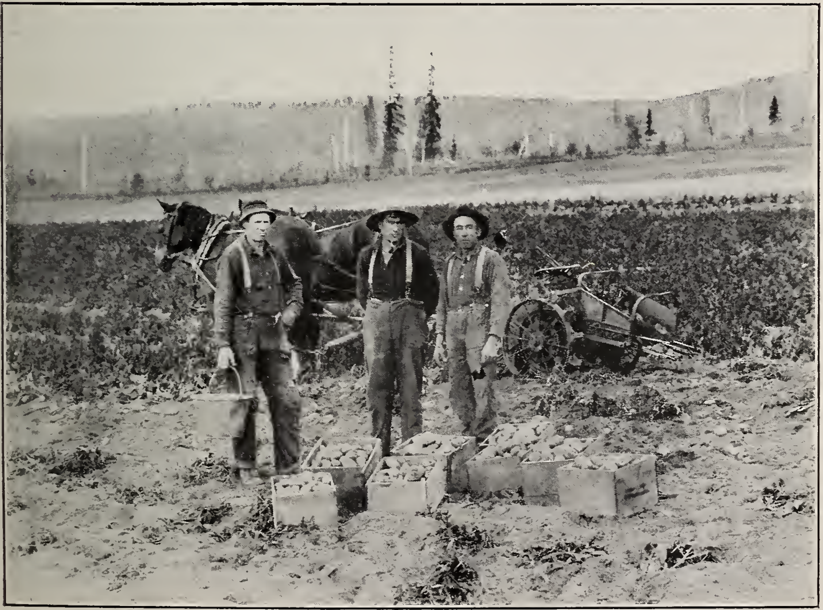
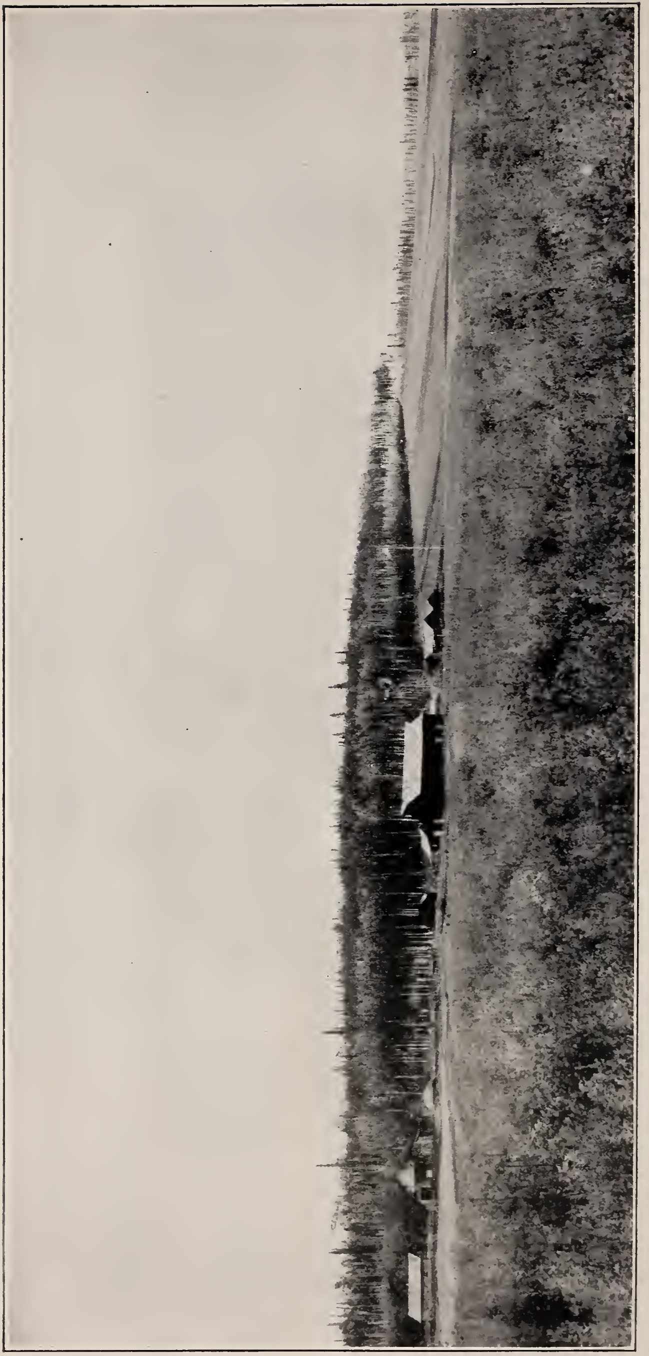


FIG. 2.—DIGGING POTATOES ON RANCH NEAR FAIRBANKS.

PLATE II.



FAIRBANKS STATION, 1919.

the various towns. It was found that milk from tuberculous cows had been unintentionally distributed to the people. At Fairbanks, for instance, 25 cattle were condemned out of a herd of 26 head, and in other places almost equally large percentages of the dairy cows were found to be reactors to the tuberculin test. Both owners of the cattle and consumers of the milk were ignorant of the existence of the disease, and, to a very large degree, also ignorant of the dire consequence which might result from the use of such milk, especially among children. The owners of the cattle should be reimbursed for their losses, and it is suggested that the plan now in operation in the States, whereby a certain percentage of the losses is reimbursed from Federal funds, be extended also to Alaska. The condemnation of affected cattle was a very serious loss to the owners, and the law under which the animals are condemned should certainly make provision for at least partial restitution of the loss. Dr. Parker's work is not complete at this writing and a detailed report can not, therefore, be submitted. From August 22 to December 9, 1919, he had tested 193 head belonging to 28 owners. Of these, 115 head were passed as sound, 73 were condemned, and 5 head were regarded as suspicious.

SITKA STATION.

At the Sitka Station work embracing the plant breeding and the testing of vegetables, fruit bushes, and fruit trees was continued in accordance with plans detailed in former reports. The salient features of the work are outlined in the notes by C. H. Benson, who was in charge almost the entire summer, the writer being absent on visits to Kodiak, Rampart, and Fairbanks Stations.

The more pressing needs of the Sitka Station at this time are the extension of the cultivated area and the erection of another cottage on the grounds for the use of the station personnel.

The station has sustained a loss by the resignation of C. H. Benson, who has gone into business for himself at Seattle.

RAMPART STATION.

The most important work under way at the Rampart Station is the production of new varieties of grains which will be best suited to the short season and peculiar climatic conditions prevailing in interior Alaska. As every plant breeder knows, it takes time, patience, good judgment, and careful selection to produce new varieties of merit. Breeding work with barley was begun in 1909, since which time every attention and care has been required to develop and establish really valuable varieties. Inasmuch as this work has already been described with more or less detail in former annual reports, the following summary is confined to some of the things since accomplished.

BARLEY.

As mentioned in a previous report, work with barley breeding is being carried on principally to obtain and perpetuate a type of barley which will be not only beardless but also early in maturing. So far, the variety known as Pamir (the seed of which was secured through the United States Department of Agriculture from the high plateau in the Pamir Mountains) has been found to excel in point of earliness, it having matured at the Rampart Station in 80 days during favorable seasons. One of the hybrids resulting from a cross between Champion (a beardless and rather late variety) and Pamir is a very desirable type of barley, being beardless like the female parent, but larger and more vigorous. This hybrid, known as 1a, is 6-rowed, medium early, and has dark-striped glumes. Hybrid No. 1a was pollinated with Hull-less, a smooth, 4-rowed, medium early variety obtained from the United States Department of Agriculture (S. P. I. No. 12709). This cross became known as No. 19b, the heads of which were larger than those of the parents, averaging 4½ inches in length, and some containing as many as 72 grains. Small increase plats of this hybrid were ripe and harvested by August 18, 1919, although the season was unfavorable. It is believed, therefore, that this strain will mature in interior Alaska during any normal season. Of the dozen or more barley hybrids produced, No. 19b has been found the best, though some of the others mature earlier still. Many are black, 2-rowed, and beardless; some are black, 6-rowed, and beardless, one of the parents having been a black, 2-rowed, bearded variety which matured medium early in interior Alaska.

WHEAT.

Hybrid spring wheat.—Of the many hybrids produced as the result of a cross between Chogot (Siberian No. 1) and Marquis, one, known at the station as No. 30a, is very promising. While it resembles the female parent in that the heads are bearded, it is more vigorous, and has larger heads and stronger straw.

Another type of No. 30a which is particularly satisfactory is light brown in color, has a smooth (beardless) head, and spikelets producing 5, and sometimes 6, kernels, instead of 3 or 4. These types are barely established, and possibly will vary a little for a year or two, but they are highly desirable varieties for interior Alaska. The Marquis, which has a great reputation in some sections of the Northern States and in Canada, rarely matures at the Rampart Station and is altogether too late to be depended on. Siberian No. 1, on the other hand, is very early, a characteristic which has been transmitted to the progeny. Although not quite so early as the female parent, the hybrids were ripe this year before the end of August.

Hybrid No. 62a, secured from this cross, somewhat resembled the male parent, though its head was much more vigorous and the spikelet contained one or two more grains. These hybrids are now being grown in increase plats in order that their seed may be obtained for distribution to the farmers.

OATS.

In connection with the work of oat breeding, it is desired to call special attention to the cross known at the station as No. 51a. This hybrid is the result of crossing Hull-less No. 304 with Norwegian No. 117. The pistillate parent is a medium vigorous, rather late variety having multiflorous spikelets and kernels which thrash out without hulls. It is a yellow oat, and, because of its habit of maturing rather late, is not desirable for the interior of Alaska. The staminate parent is a moderately vigorous, rather early, black oat, having grains which are slender, somewhat small, and black. Its exceptional merit lies in its earliness. Hybrid No. 51a shows characteristics transmitted by both parents and is better than either in regard to size and vigor. Some of the offspring are black like the male parent, multiflorous and hull-less like the female parent, partaking of the early characteristics of the staminate parent. Only two generations of this type have been grown, so it is not yet established. Some of the progeny are white and multiflorous like the female parent, others are black and triflorous like the male parent, but the principal facts are that the hybrids are not only more vigorous than either parent, but they mature almost as soon as the male parent, whose chief value lies in its earliness.

WINTER GRAIN.

Up to the present, no hardy winter wheat has been found for Rampart. The so-called hardy varieties of winter wheats are invariably winterkilled when tried out at Rampart. On the other hand, winter rye can be grown with very great success. So far, Hogot is the best variety of rye tried at this station. Some crosses have been made but none has become established.

LEGUMES.

Experiments in growing alfalfa have been described somewhat in detail in former reports. *Medicago falcata* is the only entirely hardy alfalfa that has so far been discovered. The variegated flowered hybrid known as Grimm, which for several years was thought to be hardy, succumbed to the rigorous weather two years ago, whereas the yellow-flowered *M. falcata*, grown under identical conditions, did not suffer at all from the cold weather. Inasmuch as seed is to be raised from this species, it is never cut for hay. In 1918 considerable seed was ripened and saved, but the cold season of 1919 was unfavorable to seed production and only a small amount matured.

Seed from cabbage, parsley, parsnips, peas, Chinese cabbage, spinach, turnips, and radishes has been successfully raised at the Rampart Station. This is indicative of future possibilities and the station hopes to establish by selection many varieties which can be depended on to mature seed in fairly good summers. Field peas that will mature seed in the short summers of the interior will be a great asset to Alaska. In former reports mention has been made of a garden variety known as "Alaska" which has been acclimatized to the extent that it will mature seed every year. Nearly 1,400 pounds of this pea was matured last year. The variety Alaska when plowed under acts as a renovator of the soil. Since, however, it is not sufficiently vigorous to yield a large amount of green manure, other equally early and more vigorous varieties are being sought.

ADDITION TO EQUIPMENT.

The most valuable acquisition to the stock of implements at the Rampart Station during the past year was a tractor which thoroughly does the work of six horses. This tractor pulls a gang of two 16-inch plows, plowing readily to a depth of 10 inches and so completely turning under vegetation 4 feet high that scarcely any green sprigs are visible on the plowed ground.

No land was cleared at Rampart the past season because of lack of funds. It is planned, however, to enlarge the cultivated area to 125 acres or more at this station as soon as practicable. The larger area is now needed for increase plats for field tests of the hybrid grains that are produced. This is also needed to summer fallow a larger percentage of the cultivated ground each year and thus to aid in maintaining fertility. The purchase of concentrated fertilizers is not justified except for special purposes, and, because the station lacks live stock, except a team of work horses, no stable manure is available for fertilization. Therefore, plowing under green manure will have to be resorted to for fertilizing purposes.

Among the improvements at the station is a telephone line along the bank of the Yukon to a favorable site for a crossing, then along the bank on the opposite side, where it connects with the long-distance telephone in the town of Rampart. The line, which is about 3½ miles long, is a very great convenience to the station, especially during those three or four weeks in spring when the ice is breaking in the river, and also in the fall when the river is in the process of freezing. At such times it is hazardous to cross in a small boat.

Another improvement has been the rebuilding of the root cellar, the poles and logs of which had rotted out. An additional story was built of logs to afford storage room for many things and to help keep out the cold during the winter.

Another cottage is needed at this station. With the expansion of the work more room is required to house the larger working force already needed.

FAIRBANKS STATION.

So far as it is practicable, the Fairbanks Station is operated as a model farm, which is used to aid and inspire the farmers of this vicinity. (Pl. II.) Experiments are conducted with the most suitable varieties of early-maturing grain that can be found. If they prove adapted to the climate and the country, these varieties are increased and their seed distributed to any farmers who want it. Small quantities are given outright free of charge, but larger quantities are sold at the regular market price. In this manner the early spring wheat known as Chogot (Siberian No. 1) has been introduced. It is the earliest spring wheat so far discovered and has never failed to mature. The variety known as Romanow, another spring wheat, has also been introduced. This wheat is some 10 days later than the Siberian and occasionally is caught by early fall frosts before it has had time to mature. The superintendent of the Fairbanks Station makes frequent visits to the neighboring farms in the Tanana Valley to advise with the farmers about their crops and methods of culture.

During the season of 1919 an aggregate of about 5,000 bushels of grain was raised in the sections of the Tanana Valley lying near and about the town of Fairbanks. The season was not ideal, nevertheless all crops matured, and the farmers are greatly encouraged by the prospects of making Alaska a successful grain-growing country. Plans are being formulated for the cooperative purchase of a 45-horsepower tractor which can be used in clearing land. If this purchase is made, the area in grain crops doubtless will be doubled during 1920. As stated in the report for 1918, the station has purchased a small roller flour mill which is operated by the station tractor. At this writing the bolting attachment, which had been planned, has not been secured, but it will be added to the mill during the next fiscal year, when it will be possible to supply a much larger demand for flour. At present only Graham flour can be ground in the mill. During 1919 Fairbanks merchants imported and sold 380 tons of flour. This amount can be grown in that section of Tanana Valley tributary to the town as soon as a sufficient area of suitable land has been cleared and put under culture. It will be the aim of the station to encourage this work and thus to assist in the development of the country.

The station has under cultivation 100 acres, which is deemed sufficient for the demonstration work in which the station is engaged, and for the growing of pure lines of seed for distribution. The problem which now looms largest among interior farmers who have cropped their cleared land for several years is twofold: How to maintain fertility of the soil and how to conserve moisture for the growing of the crops. The matter of maintaining fertility will in the long run become the more important question and can be solved only by the growing of leguminous crops which can be plowed under and by the adoption of a rational system of rotation. The station has inaugurated such a system of rotation for demonstration purposes, but as yet has no results to report.

The conservation of moisture is a problem that demands attention. The soil nearly everywhere is frozen, when the ground is first cleared. The first few crops require only a slight rainfall, since the ice in the ground gradually melts, furnishing sufficient moisture which, by capillary action, rises to the roots of the growing crops. In the course of a few years, however, the ice recedes to a depth of 6 or 7 or more feet from the surface, and this reservoir of moisture is no longer available for the crops. It then becomes necessary to use machinery which will not only pack the soil a few inches below the surface and thus hinder evaporation, but at the same time maintain a surface mulch of loose soil, which, by hindering the capillary action, prevents evaporation. The average yearly rainfall in the Tanana Valley is about 12 inches. Some years the precipitation has reached 16 inches and in other years it has been less than 10 inches. Whenever possible, a good farmer conserves moisture from the melting snows by fall plowing rather deeply so that the soil can absorb and retain the snow water. Aside from the work of testing varieties of grain, vegetables, and fruits, and the various methods of culture, the station will devote its major energies to problems relating to the maintenance of fertility and the conservation of moisture in the soil.

A detailed account of the season's work will be found in the report of M. D. Snodgrass, assistant in charge, pages 44–55.

KODIAK STATION.

CHANGES IN PERSONNEL.

The Kodiak Station has undergone an entire change in its personnel during the past year. W. T. White, for a year and a half assistant to the superintendent of the Fairbanks Station, was promoted to the superintendency of the Kodiak Station, where he took charge April 13, 1919, succeeding H. E. Pratt, who resigned March 17, 1919. Z. T. Halferty, United States Commissioner at Kodiak, was in charge from March 14 to April 13. Mr. White has taken hold of the work with commendable energy. He is a graduate of the Kansas State Agricultural College and has had wide experience in all phases of farming. His promotion to the superintendency augurs well for the Kodiak Station. B. C. Parker, from Kansas City, Mo., was appointed veterinarian to the station and assistant to the superintendent, May 1, 1919.

HISTORICAL.

Kodiak Station is operated under great disadvantage, due to the fact that it is divided into two sections 15 miles apart. At the time the reservation was made (1898), it was not found practicable to secure all the land needed for the operation of a live-stock breeding station. The reservation was, therefore, enlarged by order of President William H. Taft, dated April 1, 1912, by the addition of 3,000 acres at Kalsin Bay, located on the northeast side of Kodiak Island. This same order included the reservation of Near Island, which comprises some 200 acres and lies across the channel from the town of Kodiak.

Since the main area of the cattle range is located at Kalsin Bay a power boat, the *Red Wing*, is operated to make trips for communication between this place and headquarters at Kodiak. The arrangement is satisfactory in most respects, but the control and maintenance of a boat, together with the skiffs and small boats needed in transferring live stock, feed, etc., from one place to another, tend decidedly to increase the expenses of this station over those of the other stations in Alaska. Because of the distance separating these stations, it is necessary to maintain two crews of men and have two establishments of barns, silos, and outbuildings, as well as to transfer from one place to the other work horses, implements, and machinery, as they are needed. The silage and hay on which the cattle are fed are secured chiefly from native pastures, though some lands at Kodiak and at Kalsin Bay have also been broken and are cultivated to forage crops. The native meadows, where grass is cut for hay and silage, are scattered over a wide area. The most valuable silage grass obtained by the station is the beach grass (*Elymus mollis*), which grows along the sandy beaches wherever it can get a foothold. In order that this grass may be gathered, mowers, rakes, and haying crews must be transferred to the various places where it grows. It is then loaded into boats and towed to the station. Here it is again handled, loaded into wagons, and hauled to the barn, where it is finally cut and elevated into the silos. Another excellent silage material is a sedge or marsh grass (*Carex cryptocarpa*), which is eaten by the cattle in preference to any other feed.

In 1912 all pastures of the station were covered with a layer 18 inches deep of volcanic ash from the outbreak of Katmai volcano over on the mainland, 55 miles away. This necessitated the shipping of the cattle to the State of Washington, as it was cheaper to ship the cattle than to import feed into Alaska for them. They remained in Washington two years, at the end of which the pastures had sufficiently recovered to supply feed to the herd. In the meantime, the herd had increased to considerably more than 100 animals, some 70 head of which were sold before the herd was returned to Kodiak. The cattle were tested for tuberculosis before the sale in December, 1913, without a reactor being found among them, but in the summer of 1916, two years after their return, two or three of the cows showed symptoms of tuberculosis. A Government veterinarian was then secured to test the herd, when more than 50 per cent of the cattle reacted. Only a few of the reactors were killed. All those which showed no clinical symptoms of disease were isolated at Kalsin Bay, while the sound animals were isolated at Kodiak. It was decided to experiment with the reactors in order to ascertain whether healthy calves could be reared from tuberculous parents, and for that purpose a modified form of the Bang system, a method of treatment which originated with the Danish veterinarian, Dr. Bang, was carried out. The reactors were all purebred stock and too valuable to destroy where a possibility existed of securing healthy calves from them. The main features outlined by the system consist of separating the calves at birth from their dams and feeding them on sterilized milk. The experiment has been a success. Ninety-one per cent of the calves dropped in this herd and so treated proved sound. It should be remarked, however, that the calves did not thrive as well, nor grow as fast, as calves that were permitted to suckle their dams. The experiment will be brought to a close in the spring of 1920. The herd will again be tested in April of that year and all reactors will be slaughtered in order that the station may have a clean herd.

In the summer of 1916 a few head of purebred Holstein-Friesian cattle were purchased and added to the herd at Kodiak, the object being twofold: To ascertain how this breed of cattle would thrive under the rather harsh climatic conditions, and also to make reciprocal crosses between the Galloways and the Holstein-Friesians. It was hoped to develop a breed possessing the hardiness and other desirable characteristics of the Galloways and at the same time retaining some of the milking qualities of the Holstein-Friesians. The Galloway is a beef breed, pure and simple. The efforts so far made at the Kodiak Station to develop milking qualities have been without success, and as yet there is very little demand among Alaska settlers for beef animals. The pioneer farmer wants a hardy cow which will give a good supply of milk, and, eventually, serve as a good carcass for beef. The affliction of the herd with tuberculosis has interfered to a large extent with results and the station has at present only 3 crossbred heifers and 3 crossbred bull calves, but the experiment will be continued until definite results are obtained.

The herd now consists of 20 head of sound Galloways fit for breeding, and 8 head of purebred Galloways which, having reacted to the tuberculin test, will be slaughtered in order to clean up the disease. The station has 9 head of purebred Holstein-Friesian cattle, and in addition, as above stated, 6 crossbred calves.

A HERD BULL.

A new Galloway herd bull was purchased in May, 1919, from Mr. R. W. Brown, secretary of the American Galloway Breeders' Association at Carrollton, Mo. It is thought that this splendid animal will be a large factor in improving the herd. Two bulls, formerly used in the herd, were found to be tuberculous. One of them was slaughtered and the other is still head of the reacting herd at Kalsin Bay.

A purebred Lincoln ram was also purchased in May, 1919, and now heads the station's small flock of sheep.

THE NEW BARN.

For the past two years the Kodiak Station has struggled to get funds enough to erect a new sanitary barn at Kalsin Bay. This barn, which is now nearly completed, is 70 feet long by 34 feet wide, and contains cement floor, cement mangers, iron stanchions, and pens. It is but one story high, and has a feed barn attached to it. Overhead tracks have been provided for the conveyance of the feed in carriers from the feed barn at one end, and of the manure to a suitable receptacle at the other end of the barn. A small mountain stream, which furnishes water the year around, runs by the barn, and the water system is so arranged that the floors can be washed from this natural water supply whenever it is desired. It is intended to be a model barn after which Alaska settlers can pattern their barns, and has been made as sanitary in every respect as possible.

IMPROVEMENTS.

The two cottages intended for the use of station assistants, and mentioned in former reports, have finally been completed. One is located at Kodiak and the other at Kalsin Bay. The small, three-room cottage, originally erected at Kodiak as a dairy building, has been fitted up for the use of an assistant. Other buildings have been repaired, ditches have been dug, and fencing has been renewed and extended. The station is now in better shape than it has been since 1912, when it was temporarily vacated because of the fall of volcanic ash.

NEEDS OF THE STATION.

The two stave silos at Kalsin Bay should be replaced with concrete silos. The larger of the two, which is also the older stave silo, has so decayed as to be scarcely serviceable. The smaller silo, which is 26 feet high and 16 feet in diameter, can still be used, but as the new barn is some distance from the old barn, it is a question whether the better of the two silos is in good enough condition to be moved to the new location. At Kalsin Bay the cement foundation for a dairy building has already been laid. The station needs a sheep barn, a blacksmith shop, and an implement shed. A new silage cutter is also needed, the old one having worn out. The 12-horsepower engine employed in operating the cutter likewise needs extensive repairing and new mowers and minor tools are wanted. The tractors in use at Fairbanks and Rampart Stations have done such excellent work that it is deemed advisable, from the standpoints of economy and efficiency, to provide the Kodiak Station with one also. In order to raise more feed for the herd it is absolutely necessary to enlarge the area under culture, both at Kodiak and at Kalsin Bay. The Kodiak Station has only light horses, which can not well do the heavy work required in deep plowing to turn up a few inches of the black soil which lies under the layer of volcanic ash. The efforts of the station to improve pastures and to cultivate the soil have demonstrated that whenever the original soil, rich in humus, has been turned up so that it could be mixed with the top layer of volcanic ash, a decided improvement in the production of the soil has resulted. A tractor is needed to provide the power necessary to do this work.

For a detailed account of the work at the Kodiak Station, reference is made to the report of the assistant in charge, W. T. White, on pages 55–65.

MATANUSKA STATION.

The Matanuska Valley in time will be one of the best agricultural districts in Alaska. Development will be slow, because the country is heavily timbered and most of the homesteaders have to depend on their own efforts for the clearing of their land. The country is rolling, and has a good quality of soil, the greater part of which is designated as silt loam. Because of its location the Government railroad will afford excellent transportation facilities to the coast and to the interior. Most of the valley lies between latitude 61° and 62°. The average frost-free period is 134 days. It has been demonstrated that in addition to all kinds of early grain crops, potatoes, vegetables, and berries of all sorts can be grown and matured in the valley. For this reason an agricultural experiment station was located at Matanuska, where work was started in 1917. The station is still in an undeveloped condition. A barn and other necessary buildings are under construction, and during the past year the station devoted its energies largely to the pioneer work of clearing land and preparing foundations for the erection of adequate buildings. The station now has a total of 44 acres under culture. The climatic conditions are more favorable at this station than at either the Rampart or the Fairbanks Station. Anything that can be grown at the latter stations can be grown at Matanuska, and, in fact, the range of crops can be widened beyond the scope possible at those stations. Despite the fact that the summer of 1919 was unfavorable all crops did well except a few late varieties of grain.

The Matanuska Valley is particularly well adapted to mixed farming, in which dairying and stock raising rank as leading features. In order that these branches of farming may be developed, it is planned to introduce a hardy breed of milking cows at the station. It is believed that the milking Shorthorns will meet the requirements better than any other breed, and for this purpose a stock barn is now being constructed. The cattle barn will be 34 by 72 feet and contain 24 stalls for cattle, 2 bull pens, and 2 calf pens. It is to be of approved sanitary construction and will have cement floors and mangers and iron-pipe stanchions. Like the Kodiak barn, it will have no storage room overhead for feed, and it can be kept absolutely clean. Only purebred cattle will be introduced, and it is hoped that in years to come the station will be a source from which the farmers in the valley and elsewhere in Alaska can be supplied with purebred stock. It is planned to introduce some stock before the close of the fiscal year 1920.

The station will be made to serve the people in every other way possible. Pedigreed grains will be grown, and farmers can obtain small quantities of such varieties as do well here. A nursery of hardy fruit bushes and some hardy apple trees will be maintained for distribution throughout this section of Alaska. A small beginning has been made with this nursery, and it will be expanded to meet reasonable demands.

Detailed work of the season will be found in the report of F. E. Rader, assistant in charge of the station, on pages 65–78.

REPORT OF WORK AT SITKA STATION.

By C. H. Benson, *Assistant.*

Weather conditions in the summer of 1919 were very unfavorable for either horticultural or agricultural work. It was unusually cold and cloudy throughout the growing season, yet, despite these conditions, fair results were obtained. The ground was free from frost and in shape to begin working the first week in April, when considerable transplanting was done. All the strawberry plants that had been tagged with yellow labels in 1918 were dug and planted 4 feet apart each way in a plat by themselves. When the seedlings of 1917 breeding were transplanted to the field in the spring of 1918 they were set in the row only 18 inches apart because of lack of space. Every other one of these was dug and planted 3 feet apart each way. Cherry trees, shade trees, and shrubs, which had been scattered about in plats B and C, were dug, some of which were planted in a group at the east end of the greenhouse, and others in nursery rows in plat C. Plowing commenced on April 11 and all the ground was ready for planting by April 24.

A piece of hillside ground having southern exposure was seeded to early vegetables on April 22 to determine the value of early seeding. Other vegetables were planted for trial on May 3 and 6. Radishes, beets, carrots, turnips, spinach, and peas planted April 22 did not reach edible size any sooner than those planted 11 days later, nor were they so good in quality.

Some new land was cleared at odd times. Two hundred feet of corduroy road was laid across a swampy place and completed the road system so that all plats are now accessible with horse and wagon. Several drains were laid last winter in place of old ones that had either clogged or caved in. The cottage received two coats of paint and the roof a coat of creosote shingle stain.

VEGETABLES.

Cabbage, cauliflower, kale, and Brussels sprouts were started from seed planted in the greenhouse April 2, transplanted to flats April 21, set out in cold frames to harden May 12, and planted out in the field May 22.

Cabbage.—The following varieties were tried again this year: Early Copenhagen Market, Stein's Flat Dutch, Early Winningstadt, Large Wakefield or Charleston, Danish Ballhead, Danish Round Red, Drumhead or Savoy, Early Jersey Wakefield (Rampart-grown seed), and Portland Seed Co.'s First Crop. The last-named variety headed first, though the heads were very small and split badly. The Large Wakefield again proved the best early variety. The first head was cut August 9. All plants of this variety headed, the heads being crisp, tender, and uniform in size, and averaging 4 pounds in weight. Early Copenhagen Market was the next best variety, 95 per cent being round, solid heads, averaging 5½ pounds. This is an excellent fall and winter cabbage. Early Copenhagen Market and Large Wakefield are without doubt the best varieties for the coast region of Alaska. Both should be started early in April and planted out as soon as the danger of a severe frost is past. Stein's Flat Dutch and Drumhead, or Savoy, did reasonably well, 60 per cent heading.

Savoy is a deliciously flavored cabbage. Early Jersey Wakefield, from seed grown at Rampart, grew mostly to leaves. About 50 per cent were small, pointed heads of no particular value. Only about 30 per cent of Danish Ballhead, Danish Round Red, and Early Winningstadt headed. Clubroot, a slime mold, did very little damage this season. Only 6 plants out of 850 showed any sign of being affected, and these were pulled up and burned. Tar paper collars again were used with good results as a precaution against root maggots.

Cauliflower.—Early Snowball proved the best variety this year, Burpee's Best Early coming a close second. Algiers did not come up to the mark made last year, when it proved to be the best main-crop variety. Poor seed was probably the cause of the failure. The plants made a vigorous growth, but the heads were small and loose.

Kale.—Three varieties were grown, Dwarf Curled Scotch, Tall Curled Scotch, and Emerald Isle, a dwarf variety. All made extra strong growth. The dwarf varieties are the most desirable for home gardens.

Brussels sprouts.—These made vigorous growth but failed to head. Many little sprouts were set, but the majority failed to fill out. Odense Market, Danish Prize, and Long Island Improved were grown.

Rutabagas.—Varieties Burpee's Breadstone, White Sweet Russian, and Bangholm Pajbjerg were grown, the seed of which was planted May 3. Early in the season the first two varieties showed effects of root maggots. Later, they went to seed without producing any roots of edible quality. The last-named variety proved very satisfactory, yielded a heavy crop of good roots, and showed no injury from root maggots. This variety may prove valuable if tried again.

Turnips.—The varieties Early White, Flat Dutch, Extra Early White Milan, Red Top White Globe, and Petrowski were grown. Extra Early White Milan did well as an early turnip and was ready for use a few days ahead of Petrowski, though the latter is by far the best turnip. For winter use it is best when planted from June 1 to 15. The other two varieties were badly affected by root maggots and did not amount to anything.

Beets.—The four varieties of beets planted gave very poor results, again proving it useless to try to raise beets on this soil. Nearly all sent up seed stalks without developing roots of edible size. The varieties tried were Burpee's Extra Early, Dark Stinson, Early Model, and Burpee's Columbia.

Swiss chard or spinach beet.—This is an excellent vegetable, having leaves which can be cooked like spinach and stalks which are palatable if prepared in the same manner as asparagus. Two varieties were grown, Lucullus and Large Ribbed White, both doing well.

Mangels or stock beets.—Four varieties of these were grown, Mammoth Prize Long Red, Giant Red Eckendorf, Golden Tankard Yellow Fleshed, and Danish Sludstrup. The season was unfavorable and they were severely checked by cold weather. Fifty per cent sent up seed stalks, the other 50 per cent developing medium-sized roots. The red varieties were the best. Mangels are not only good stock feed, but an excellent food for chickens and much relished by them.

Carrots.—Two varieties of table carrots were grown, Early Scarlet Horn and Chantenay or Model. Both yielded a good crop of large, well-shaped roots. The yield of Early Scarlet Horn was 1.3 pounds to the lineal foot of row, or 27,000 pounds per acre. Chantenay yielded at the rate of 26,300 pounds to the acre. The Yellow Giant stock carrot was also grown and did moderately well, yielding at the rate of 14 tons to the acre. It makes an excellent feed for stock.

Lettuce.—The nine varieties of lettuce tried were Portland Seed Co's. New Crispette, May King, Burpee's Brittle Ice, Grand Rapids, White Heart Cos or Celery, Burpee's Earliest Wayahead, Big Boston, Curled Simpson or Silesia, and Giant Glacier. May King was first in earliness with Big Boston and Burpee's Earliest Wayahead second. Burpee's Brittle Ice was excellent in quality and extra crisp and juicy. These also remained in marketable condition longest before sending up seed stalks. Heads of Giant Glacier were crisp and juicy, and when cut measured 18 inches across. Portland Seed Co.'s Crispette was also extra good. All varieties did well, those tending to head doing so to perfection. The first seed was planted in the greenhouse April 2, transplanted to flats April 22, set out in cold frames May 12, and placed in the field May 27. The second planting was carried on in the same manner six weeks later. From these two plantings, large, solid heads were cut from July 25 until the first heavy frost, the latter part of October.

Radishes.—Nothing new can be said about these. By successive plantings good radishes were pulled continuously from June 15 until the latter part of October. Vick's Scarlet Globe, Burpee's Earliest White, French Breakfast, White Icicle, and Scarlet Turnip White Tipped were all tried and found good. The Icicle remained in edible condition longest.

Peas.—Peas were partly a failure this season, particularly those planted in peaty soil. Continuous cloudy and damp weather caused the plants to become affected with anthracnose before they started to bloom. Successive sprayings with Bordeaux mixture failed to check this disease and some varieties were destroyed. Those that survived did not yield a 50 per cent crop. Two rows of Early Alaska and Burpee's Extra Early, which were planted on a hillside in red soil, did moderately well and were not affected by any disease.

Parsnips.—The only variety grown was the Guernsey, which produced a long, smooth, excellent root. It did very well and yielded a crop about on a par with carrots. Parsnips can be left in the ground all winter, but if this is not practicable they can be allowed to stand through a good freeze as frost improves the flavor.

Onions.—Another thorough trial with onions has proved that large onions can not be grown here in the average season. It was thought that by setting out young plants instead of planting seed in the open, this could be accomplished. The seed was planted March 26 in the greenhouse, transplanted to a hotbed April 28, and set out May 10 in a heavily fertilized and well-prepared plat. None of the bulbs was more than half developed when pulled in October. The varieties tried were American Grown Prizetaker, Extra Early Red, Australian Brown, White Portugal or Philadelphia Silverskin, Southport Yellow Globe, Southport Red Globe, and Southport White Globe. While large onions can not be grown, excellent table onions can be raised by planting seed in well prepared, rich soil early in the spring.

The variety Perennial Top onion as an early green onion is hardly likely to be surpassed. A few old plants will produce a number of sets which appear in bunches on flower stalks in place of flowers. These little sets can be picked when in fairly matured condition, separated, and planted. Excellent table onions were pulled early in May of this year from little sets planted in the fall of 1918.

Chives or grass leek.—These are at home in Alaska and grow to perfection.

Leek.—Leeks did moderately well this season. Two varieties were planted, Broad London and Monstrous Carentan, the latter failing to germinate.

Celery.—Despite the fact that the season was late and cold, medium success was had with celery. The stalks were not very large, but of excellent quality. Golden Self Blanching and White Plume were grown.

Kohl-rabi.—This vegetable was a complete failure. Seed stalks were sent up, but the stems did not swell.

Mustard.—Fordhook Curled and Chinese were grown with very good results. Where spinach can not be raised, mustard proves an excellent substitute. It is good for greens and can be had throughout the season by planting seed every two or three weeks.

Potatoes.—Potatoes suffered considerably from the lack of heat and sunshine, the peaty soil in which they were grown never having been thoroughly heated. Consequently the yield was much lighter than in previous years. Potato planting commenced May 7, when all the seed had nicely sprouted. The first shoots appeared June 4, and on June 28 all were above ground, some having made considerable growth. Seventy-one named varieties were grown in from 25 to 30 hills of each kind. In addition, 270 varieties of seedlings were grown in from 5 to 25 hills of each, except a few that proved extra good in 1918. All seedling potatoes suitable for seed were saved and planted this year (1919) so that they may be tested elsewhere. The yield of named varieties ranged from 100 to 370 bushels per acre. Varieties Admiral Dewey, Gold Coin, Green Mountain, White Rose, Early John, Rural New Yorker, Snowball, Carman No. 4, and Earliest of All made the best showing.

Seedling No. 753 yielded at an average 432 bushels per acre, which was the highest yield recorded. A number of seedlings matured normally, being earlier than any of the named varieties.

The following named varieties, which were discarded as unsuited to this locality, may do better elsewhere: Old's Prolific, Peach Blow, Beauty of Hebron, Pride of France, Early Puritan, Green Mountain Seedling, Russet Rural, Irish Cobbler, "Landreth," Northern King, Pride of Multnomah, Quick Lunch, Knowles' Big Cropper, Pure Early Rose,[1] Carman No. 3, California Golden Russet, Noroton, Bliss Triumph, Dearborn, Extra Early Sensation, Uncle Sam, Woodbury White Rose, Netted Gem, and Early Sunrise. The raising of potatoes from true seed was continued and 100 hills were dug and numbered for further trial.

Rhubarb.—Rhubarb did exceedingly well and large stalks were cut throughout the season. The average yield per plant was 25 pounds.

Asparagus.—The asparagus made a fair showing this year. This vegetable has not been given a fair trial, as results at first were most discouraging. When planted in a well-prepared bed, asparagus should produce good tips.

Horse-radish.—This spring an old root of horse-radish, found growing at the edge of a field, was cut into small pieces and planted The pieces made good growth and produced good-sized roots.

SMALL FRUITS.

Strawberries.—Weather conditions were most unfavorable for the growing of strawberries. They came through the winter in first-class condition, however, blooms first appearing the latter part of May and continuing through June. During that time the weather was so rainy and cold that fertilization of the blooms could hardly be expected. However, nearly all set a full crop, which is another good point in favor of the Sitka hybrids. All the berries developed and colored up to perfection, and the first ripe berries were picked July 23.

Of the new hybrids, 1,064 came into bearing. These consisted of the following crosses: 1503 × Native of coast region, 1449 × Chesapeake, Early Jersey Giant × Native of coast region, 468 × John H. Cook, John H. Cook × Native of coast region, 1449 × Brandywine, 3653 × Brandywine, 3653 × Magoon, and 1503 × Magoon. Among these are some excellent berries, and a great improvement has been noted in color, the fruit being dark, blood red throughout. Moreover, the growth of some of these plants was nearly perfect. A number of plants showed normal growth, perfect blossoms, productivity, large berries which were of good color and excellent flavor, and peduncles strong enough to support the berries and keep them off the ground. These plants have proved hardy for two seasons. If they should continue to hold all the above mentioned good characteristics and become staple varieties, little or no improvement can be made on them for some time to come. As the result of 1918 breeding, 1,723 hybrids were set in the field May 16. These made good growth and will fruit next season.

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[1] Not true to name.

Raspberries.—Nothing new can be said regarding raspberries. The Cuthbert is still in the lead. Miller (*Miller's Favorite*) and Loudon were small and irregular, and none of the newer varieties mentioned in former reports have borne enough to be fairly judged. They require a long time to get acclimated.

Bensonberry.—A crossing made in 1916 between raspberry (Cuthbert) and salmonberry (yellow) brought out one good hybrid which is showing characteristics of both parents. The plant resembles the salmonberry in that the wood is light colored and the canes branch out. The leaves, light green in color, are neither those of the raspberry nor the true salmonberry. The berries are light orange, resemble the raspberry in size and shape, and have an excellent flavor, being like raspberry with the after taste of the salmonberry.

Currants.—All varieties of currants yielded well this year. Perfection again proved the best variety, the bushes being laden with berries as large as small cherries. The second best red was Albert (*Prince Albert*), a very productive variety having a slightly smaller berry. Pomona, North Star, Fay (*Fay's Prolific*), and London (*London Red*) were also good. Scarcely any difference in the four white varieties was noted. White Grape was slightly the largest. White Imperial, White Transvaal, and White Dutch were all good. Champion (*Black Champion*) made the best showing of the blacks, and produced extra large fine berries. Montana (*Black Montana*), Lee, Naples, Wales (*Prince of Wales*), and Boskoop were also good.

Wild black currants (*Ribes bracteosum*) when under cultivation showed no improvement over those in the wild state. They set fruit very irregularly and are much troubled with fungus diseases. Hybrids of *Ribes bracteosum* crossed with cultivated black currants have shown no improvement on the mother plant. They are more resistant to fungus, but the berries are small and less than 50 per cent of the blossoms set fruit. Hybrids from a reversed cross, with garden black currants as the mother plant, are identical with the other hybrids.

Gooseberries.—These made a remarkable showing this year, all varieties being laden with perfect berries. Mildew and other fungus diseases were kept in check by successive spraying with Bordeaux mixture. The foliage was in perfect condition the whole season. Lancashire Lad made the best showing, the bushes being heavily laden with large, luscious berries. Triumph, Industry, Columbus, Whitesmith, and Keepsake were also loaded with large berries. Champion, Downing, Houghton, Portage, Smith, and Pearl bore medium-sized berries and were very productive. Josselyn (*Red Jacket*) and Carrie were too small to be of any value. None of the seedlings came up to the best of the named varieties. Nos. 16, 101, 201, 207, and 208 were the best and equal in size and productiveness to Champion. Nos. 25, 62, 93, 259, 261, 291, and 305 were all small.

THE ORCHARD.

Apples.—Owing to the cold spring the apple trees did not bloom until the latter part of June and the first few days of July. All the varieties bloomed freely. However, as in former years, nearly all dropped their fruit before it was half developed. Yellow Transparent, Livland (Lowland) Raspberry, Keswick (*Keswick's Codlin*), and Siberian crab were the only trees which developed apples of any size. Most of these were irregular in shape, and none reached normal size. All trees made satisfactory growth. Much injury was done to the apple trees early in the season by deer which ate all the buds and young growth within reach.

Cherries.—These bloomed freely and set some fruit, but, as was true in seasons past, nearly all split and dried up before ripening.

Plums.—Bradshaw and Imperial Gage are making satisfactory growth, but as yet are too small to bear fruit.

Pears.—Varieties Koonce and Tyson are making fair growth. Pear blight is damaging the young growth, however, and the possibility of getting the trees to bearing size is slight. Two new varieties were received this spring, *Pyrus communis* (Belmont), a new Scotch Wales seedling, and *P. chinensis* (Chinese pear), both of which have made satisfactory growth.

ORNAMENTALS.

Shade trees.—Norway and Sycamore maples, Bolle's Silver poplar, and several other varieties of poplars are making splendid growth. The elms did not do so well this year. Some fungus disease is apparently retarding their growth. The mountain ash can not be too highly recommended for the coast region. Two small trees of white birch (*Betula alba*) are doing nicely.

Shrubs.—The report for 1917 covers all that can be said about the shrubs on trial. *Philadelphus coronarius* and *grandiflorus* (mock orange) bloomed this year for the first time. Several varieties received in the spring of 1917 have survived two winters and are making a fair growth. These will have to be under further observations before their value can be determined.

Herbaceous perennials.—Those recommended in the 1917 report made a splendid showing this year. The following have also proved satisfactory and may be added to the list:

Armeria formosa (sea pink or thrift).—This is quite a showy plant which produces in early summer double lavender flowers on wiry stems about 18 inches in height. The plant in itself is a dwarf and may be propagated by seed or division.

Cerastium tomentosum (snow in summer).—A very showy border or rock plant covered with clusters of single white flowers which during June and July resemble a snowdrift. The foliage is silvery green and ornamental in itself. This perennial is easily raised from seed.

Lychnis arkwrightii.—Another lychnis which surpasses the brilliant *L. haageana* as the flowers are a flaming scarlet in color and larger. It is a dwarf variety and easily raised from seed.

Pentstemon digitalis.—This plant is perfectly hardy and quite desirable for Alaska. Its flowers are borne on long stalks, are lavender in color, and resemble a miniature foxglove. It is easily raised from seed.

Primula (primrose).—A cross between *Primula acaulis* and *P. elatior* brought out a beautiful strain with a great range of colors. Some of the flowers are extra large and have a single blossom on each flower spike; others come in clusters. These are perfectly hardy.

Rudbeckia laciniata (golden glow).—This is an old familiar flower which does well at this station and can be grown to perfection with little care. It is propagated by division only.

Annuals.—The following were successfully grown this year: Antirrhinum (snapdragon), asters, *Bartonia aurea*, Calendula (marigold), candytuft, *Centaurea cyanus* (bachelor's button or cornflower), *Chrysanthemum coronarium*, Clarkia, Cosmos (Early), Delphinium (annual larkspur), Dianthus (annual pinks), Dimorphotheca (African orange daisy), Eschscholtzia (California poppy), Godetia, Lavatera, *Linaria maroccana* (toad flax), Lobelia, Lupinus (annual lupine), marigold (African Eldorado), Matricaria (feverfew, gold and silver balls), mignonette, nasturtiums, Nemophila, Nicotiana, petunias, poppies (double and single), pyrethrum, and early-flowering sweet peas.

The following were tried without success: *Celosia cristata* (cockscomb), *Convolvulus minor*, Datura, Dolichos (Burpee's bush), *Lobelia tenuior*, and Scabiosa.

Roses.—Out of 35 hybrid varieties set out in the spring of 1917, only 5 were alive this spring. Some were killed the first winter and a large number were found dead this spring (1919), though all had been given ample protection both winters. The roses that did live were in poor condition this spring and made only a weak growth. Roses fail to grow here principally because the temperature is too low during the growing season. The bushes make a strong growth while the plants are in good condition, but the wood never matures, and is in a soft condition when freezing weather sets in. Consequently they freeze back too severely to ever recover. When the average rosebush is planted out and left in the bed through the winter, it will live only two years, unless exceptionally warm and bright weather prevails during September so that the wood will ripen. In order to prevent losses due to winterkilling, rosebushes may be dug early in the fall (with a good clump of earth surrounding their roots) and stored in a medium dry place where they will remain dormant through the winter. When set out in the spring, such bushes should make a good showing.

Rosa rugosa and its hybrids are perfectly hardy and do well in this climate. However, they lack variety and range in color. At present the station has one double white variety (Sir Thomas Lipton), one double pink (Conrad F. Meyer), and a double red (name unknown) in addition to the singles. The double red is being propagated in quantity. The other two can easily be propagated, but because of shortage of stock no propagation has been made.

Several attempts have been made to cross Rugosas with hybrid teas with little success, the cross failing to set seed. Two seed pods ripened last summer. The seed was planted and germinated, but the little plants were very weak. Only two of the seedlings remain.

THE GREENHOUSE.

The work in the greenhouse has been carried out in the manner previously mentioned. The work of propagating and breeding, being of prime importance, has been given the preference, but some florists' stock has also been grown. The possibilities of forcing tomatoes, cucumbers, and lettuce have been investigated.

Propagating.—Several hundred each of the following were rooted in the propagating bed during the season: Double red hybrids of *Rosa rugosa*, *Lonicera japonica* (Japanese honeysuckle), *L. thibetica*, *Potentilla fruticosa*, Diervilla (Weigelia), *Spiræa vanhouttei* and *S. salicifolia*, *Cornus sibirica* (Siberian dogwood), and phlox (Miss Lingard). Several thousand plants of *Rosa rugosa* were raised from seed and grown to sufficient size to plant in the nursery. Several thousand perennials, all from home-grown seed, were started and when large enough were planted out. These consisted of the following varieties: Anthemis (yellow marguerite), Dianthus (hardy pinks), *Geum coccineum*, *Lychnis haageana* and *L. chalcedonica*, columbines (Aquilegias), Pyrethrum hybrids (painted daisies), Iceland poppies, Oriental poppies, and primroses.

Breeding work.—Strawberry plants selected for breeding purposes were brought into the greenhouse and the following crosses made: 5862 × Gold Dollar, Brandywine × 5389, 5389 × Early Jersey Giant, 8348 × 8192, 8192 × 8037, 8037 × Gold Dollar, 8192 × Early Jersey Giant, Early Jersey Giant × 8037, 8271 × 8192, John H. Cook × 3653 and 8037 × 8534. Between 1,500 and 2,000 plants have been raised from these crosses and all have been transplanted to flats. The largest are being wintered in the cold house. Those that were too small to set out are being carried over in the greenhouse.

Roses.—Alaska is in dire need of hardy roses and good work can be done in introducing and propagating them. *Rosa rugosa* and *R. nutkana* (native wild rose) thrive splendidly in this climate and hybrids from them may fill Alaska's need. A number of choice varieties of hybrid teas and plants of each of the above-named varieties were established in a greenhouse bed so that this breeding work may be fully carried out. Numerous crosses were made by using the pollen of the *Rosa rugosa* and *R. nutkana* on the teas. All but one cross failed to set seed. Failure was probably due to the inclement weather which continued while this work was being carried on. Pollen does not shed readily without sunshine. The *Rosa rugosa* and *R. nutkana* used as mother plants probably would bring better results.

Florists' stock.—Carnations, roses, chrysanthemums, sweet peas, browallias, cinerarias, calceolarias, primroses, primulas in variety, geraniums, begonias in variety, gloxinias, Jerusalem cherries, schizanthus, cyclamen, pelargoniums, fuchsias, swainsonas, bouvardias, smilax, and ferns in variety have made excellent growth this season.

Tomatoes and cucumbers.—The temperature maintained here is not high enough for tomatoes and cucumbers, yet they gave good results. Burpee's Matchless and Comet were used and both yielded a good crop of medium-sized smooth fruit. Tomatoes can be grown under glass with profit during the summer months.

Only a few vines of cucumbers were grown, the varieties being Telegraph and Giant Peru. A medium crop of large excellent cucumbers was secured, some measuring 24 inches in length. Cucumbers and tomatoes will not set fruit unless the blossoms are hand pollinated.

REPORT OF WORK AT RAMPART STATION.

By G. W. Gasser, *Assistant in Charge.*

WEATHER CONDITIONS.

The winter of 1918–19 was a fair sample of Alaska weather, a number of heavy windstorms, all from a northeasterly direction, occurring during October, November, and December. The northern lights and the parhelia were unusually brilliant and lasting. Ice began running in the Yukon October 18, and 8 days later the channel blocked about a mile above the station, leaving a stretch of open water between it and the town. This space froze over November 9, when the first cold wave of the season set in. This cold spell lasted 10 days with a minimum temperature of −46° F. The minimum for December was −60° F., which was registered on the 9th and 10th. Another period of low temperature came in January, culminating the 29th and 30th with −63° F. From then until the latter part of March the weather was fairly steady, the temperature ranging from 0° to −30° F. With March came 20 clear and 6 partly cloudy days. April had 13 clear days and May had 15. June had 3 clear and 12 partly cloudy days. July had 5 clear days and August but 1. September had but 1 clear and 15 partly cloudy. The total precipitation (melted snow) for the winter months, beginning in October and ending in April, was 3.39 inches. Of this amount, 1.14 inches fell during October. April had but 0.10 of an inch. The snowfall for the above period totaled 33.4 inches which by April had settled to a depth of less than 2 feet. The precipitation for the summer months was: May, 0.46; June, 1.22; July, 1.14; August, 1.73; and September, 2.63, the total being 7.18 inches. This was considerably more than normal and amply made up the shortage of the winter months. The precipitation for the year beginning October, 1918, was 1.32 inches above the 10-year average.

Ice broke in the Yukon May 16 and moved out without causing damage. The first boat of the season came down river May 21. On the night of August 31, after a frost-free period of 93 days, the first killing frost occurred.

GENERAL WORK.

In addition to the usual work of the station, a superstructure was added to the root cellar. As originally built six years ago the roof of the cellar consisted of earth supported by logs. Owing to the dampness from within, the logs rotted quickly and a new roof became an urgent need. The logs, cut on Squaw Creek the previous winter, were faced on three sides by a small portable mill which had been hired for the occasion. From these squared timbers the walls were built, making a structure one story high, the length and breadth of which corresponded to the dimensions of the cellar, 64 by 16 feet. The roof is arched and has been made frost proof by a substantial layer of sawdust placed on the chord forming the ceiling. Access to the superstructure is had by means of an outside stairway, which rises from a shed and is completely inclosed. This structure contains a side door which permits of products being unloaded directly from wagon or sled. The front end of the building, being well lighted, will make an admirable place in which to sprout potatoes and start cabbage and various roots for seed production.

During a dry spell in the early summer several acres of lowland were thoroughly disked and harrowed to loosen the surface layer of peat. Fire was then scattered over the field and the dry surface burned off. In places where this peaty layer was 2 feet thick the fire ate great holes and was still smoldering when the first snow fell. No clearing of new land was done this year.

July 19, 1919, the Government transport, *General Jacobs*, on her way to Fort Gibbon from White Horse, landed some building material and hardware, a tractor, and a No. 7 2-gang plow at the station. The tractor is not to supplant but to supplement the team of horses, particularly in the heavy rush work of fall plowing in the spring preparation of the ground for seeding and for belt work on the thrashing machine and wood saw.

In an effort to ascertain whether water could be found at a reasonable depth a hole was made with a miner's hand-prospecting drill, the only kind obtainable locally. This outfit worked very well until wash gravel was struck at a depth of 40 feet. After pounding away at this gravel for a day and a half without avail, the project was abandoned. The drill was too light to thoroughly pulverize the gravel, and the sand pump would not pick up coarse particles. The ground was frozen the entire depth. Pannings of the black sand and cuttings showed several pieces of free silver.

An ample water supply is urgently needed. At present, use is made of storage tanks in the cottage and stable into which rain water is piped. Since the rainfall is often very light, scarcely enough water for domestic purposes is to be had, and none at all for the greenhouse and flowers in the yard. On this dry bench land it is impossible either to grow flowers or have an attractive yard without applying copious supplies of water to them during the dry months of June and July. The only ample supply is the river, one-fourth mile away. To haul water this distance is tedious and expensive. During the winter all the water needed for domestic purposes must be hauled. The large stable tank, when filled with rain water from the barn roof, holds sufficient in the fall to last the horses through the winter. During the spring thaw this tank is filled with water from temporary floods in a near-by depression. Other large tanks could be situated on the high ground back of the cottage and filled by means of a small ram from the same source. The amount of water for subsequent use would, of course, depend on the size of the storage tanks. The chief item of expense would be the storage tanks. If the winter is not too severe, a shaft will be sunk on the bank of the Yukon in the hope of finding water after the river level is reached. That such will be the case can be proved only by trial.

During the summer and fall (1918) a telephone line was constructed which connects the station with the town on the opposite side of the river where connections can be made through long distance to Hot Springs, 50 miles away. Hot Springs is the nearest telegraph office, so that all messages are telephoned to and from that place at a charge of $1 per message. This service is rendered by a telephone company which has leased the Government-owned line formerly used for telegraphic purposes.

WINTER GRAIN.

Twenty-four plats of winter wheat and winter rye were seeded August 2, 1918. All of the varieties have been grown for a number of years, and a detailed description of them has appeared in previous reports. For a number of years, including 1919, winter wheat has been a failure. The three varieties planted were Kharkov, Sandomirka, and Andrischinskay. Further trials seem useless, the winters being too long and severe.

On the other hand, the two varieties of winter rye, Hogot and Irkutsk, were a decided success. Both varieties grew to splendid height, the taller being 75 inches (Pl. III, fig. 1). The heads were well filled and thoroughly ripe when harvested August 20. The other plats of rye were in poor ground and did not grow as vigorously. Several showed winter injury, due in part to low vitality, the result of imperfect ripening the previous season. Most of these were hybrids. Further trials of the best, Nos. 60a and 61a, will be made.

SPRING GRAIN.

Since the work at this station with small grains is confined almost exclusively to grain breeding, the only extensive plantings made were those of oats for seed and hay. In 231 small plats grain seeding began May 6, which is from 4 days to a week earlier than usual. The majority of these were head-to-row hand-planted plats, 50 kernels to a row, or whatever the number in a head of grain might be if less than 50, and the kernels 4 inches apart.

WHEAT.

Plats Nos. 1 to 7.—Some new Russian hybrid wheats, known as Eta, Beta, and Omega, are stable, at least in form, and appear

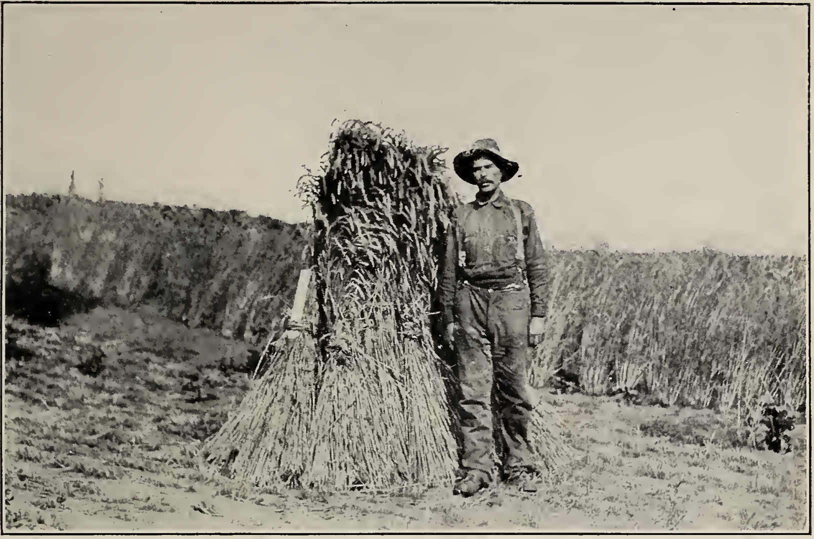


FIG. 1.—HOGOT WINTER RYE, RAMPART STATION.

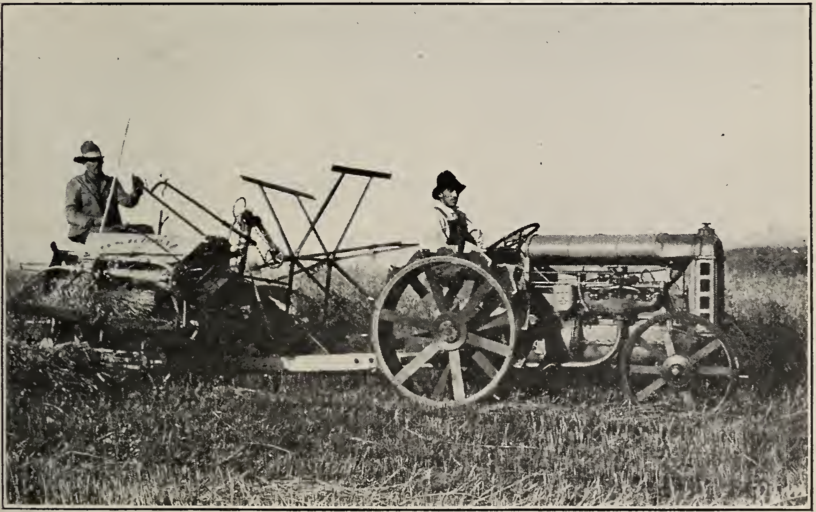


FIG. 2.—HARVESTING FINNISH BLACK OATS, RAMPART STATION.

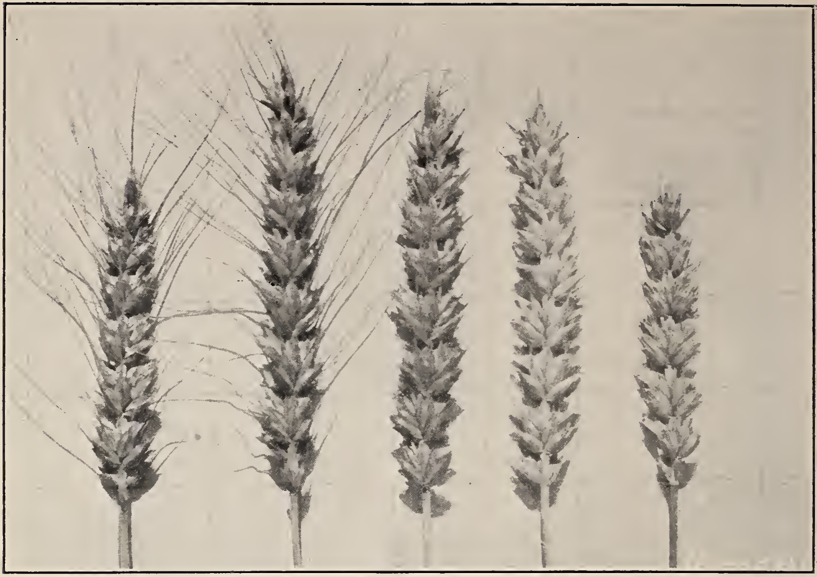


FIG. 1.—HYBRID NO. 30A, PARENTS AT ENDS. SQUARES, 1 INCH.

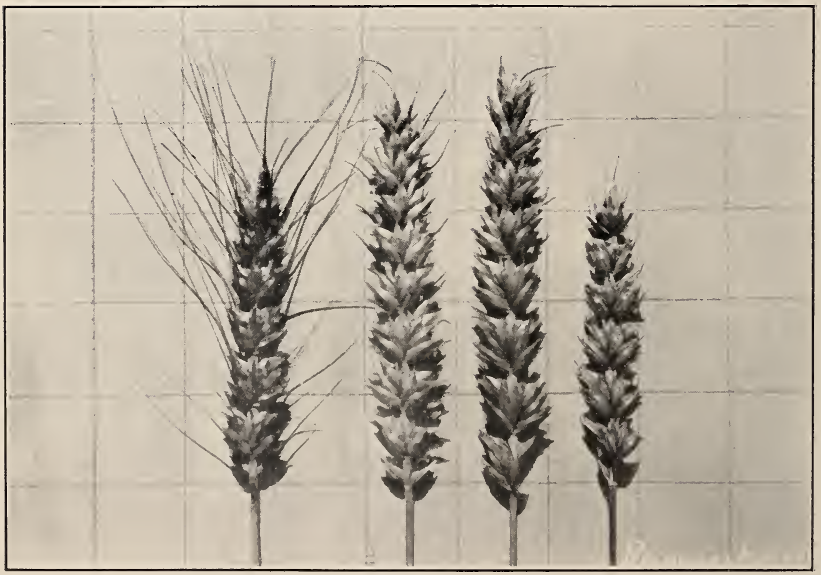


FIG. 2.—HYBRID NO. 62A, PARENTS AT ENDS. SQUARES, 1 INCH.

WHEAT HYBRIDS PRODUCED AT RAMPART STATION.

promising. The straw is of medium length, and the heads are well filled and plumper than those of Chogot.

Plats Nos. 8 to 32, hybrid No. 30a.—This interesting hybrid (Pl. IV, fig. 1) is the result of a cross made five years ago between Chogot (Siberian No. 1) and Marquis. Of the 25 plats (each plat planted with and from one head selected in 1918), 18 were apparently stable in form. The heads are large and rather open and contain as many as 75 kernels. They resemble Marquis, the staminate parent, but are much larger and earlier. Though not so early as Chogot, they are superior in all other respects. The 5 plats that did not come true split into 2 types, the bearded sort, and that having short beards at the tip (terminal) only. The terminal bearded predominated numerically, but the ratio of the one to the other, in the several plats, was inconstant.

Plats Nos. 33 to 57, hybrid No. 62a.—This hybrid (Pl. IV, fig. 2) had the same parents as No. 30a, the cross being made in 1917. Taken as a series the growth was more uniform than that of No. 30a. The progeny also split into the same two types, bearded and terminal bearded. Of the 1,240 plants, 248 were bearded and 992 terminal bearded, giving a ratio of 3.7 to 1, which is fairly close to the established ratio of 3 to 1. Hybrids Nos. 30a and 62a were also alike in that they required 117 days to mature this year, a period of 12 days longer that it took the parent Chogot to mature. Of the hybrids resembling the Marquis, but few heads ripened. This shows the offspring to be intermediate in point of ripening and a little too late for best results. In all other external characteristics the hybrid is superior to Chogot.

Plats Nos. 58 to 82, hybrid No. 63a (Chogot × Romanow); plats Nos. 83 to 107, hybrid No. 64a (Chogot × Ladoga).—Since the pistillate parent of these two series is the same and the staminate parents are alike in appearance and growth characteristics, the progeny are alike. Both parents are bearded; consequently all offspring are bearded. Some breaking up according to parental type occurred, but it was not pronounced. The heads are considerably longer than those of Chogot, the straw is coarser and taller, and the time of ripening is a few days later.

Small plats containing 12 varieties of spring wheat were grown in addition to the hybrids described above. These plats were seeded May 12 and 13 with a Planet Jr. No. 4 drill. Since the ground was poor the crop was light on all the plats. Several varieties like Ruby, Early Baart, Sunset, and Prelude, did so poorly that they are not worth further trial. They were also a failure last year. They are either very poor strains of those varieties or not adapted to this region.

Ladoga and Romanow, while not early sorts, always ripen. This year they were harvested September 5. As stated in previous reports, these two well-known varieties are identical in appearance and behavior.

Red Fife, Velvet Chaff, and Marquis failed to ripen, nor have any of the three ever thoroughly ripened in previous tests. Marquis is the staminate parent of hybrids Nos. 30a and 62a, both of which are very promising.

Chogot and H. G., as usual, ripened thoroughly. With regard to crop production, the two offer little choice. Both are fairly early and fairly productive, and neither produces coarse straw nor large heads. The grain is small, hard, and when milled, produces most excellent flour, as tests at the Fairbanks Station have conclusively shown.

BARLEY.

Plats Nos. 110 to 123, hybrid No. 19b (hybrid No. 1a4-1-1-1 × hull-less, S. P. I. No. 12709).—These were grown in adjoining plats for the purpose of comparison with their progeny. (Pl. V, fig. 1.) This hybrid is now established, two distinct types having been evolved. While both are hooded and hull-less, one has red-striped glumes and dark, amber-colored kernels; the other has white glumes and light-colored kernels. Their comparative merits will have to be determined by field trials. This barley made a most excellent appearance and by the middle of August had ripened thoroughly.

Plat No. 124, barley No. 391-2.—This barley is very inferior in all essential points and will not be tried again.

Plat No. 125, Champion.—A standard sort, hooded and hulled. It produced early heads of good size, being ripe by August 14.

Plat No. 126, hybrid 1a.—This hybrid was the pistillate parent of the 19b, 20a, and 21a series. This barley, a 6-rowed hooded, medium early variety, was ripe August 24, the heads being large and well filled.

Plats Nos. 127 and 128, barley No. 401-1.—This is a hybrid received from the Highmore substation, South Dakota. It is a beardless, 6-rowed, hulled barley, having slender heads 2 to 3.5 inches in length, and containing as many as 66 kernels. This hybrid ripened August 13, and is one of the most promising new sorts tried. A number of heads were crossed with hybrids Nos. 19b, 20b, and 28e.

Plats Nos. 129 to 132, 164, 168, and 169, hybrid No. 14a.—This hybrid continues to split into divergent types, some of which are very desirable. For example, plat No. 130 was planted to 27 kernels from a head of the 2-rowed type 4½ inches long. The offspring consisted of both 2-rowed and 6-rowed types. Some of the former were 5 inches long and the latter 4¾ inches long, bearing 14 sets of spikelets on each side and 3 kernels per spikelet. Further selections and individual head plantings were made to establish this strain, which is hooded and hull-less. These hybrids were ripe August 21.

Plats Nos. 133 to 135, 162 to 170, hybrid No. 20b.—This is one of the earliest barleys grown here, having ripened August 12. While not so large and fine appearing as No. 19b, this barley is valuable because it ripens a few days earlier. Like the 19b series, it is a 6-rowed, hooded and hull-less variety. Two years ago one kernel having a double germ was noted, and when planted produced four heads none of which contained double-germed kernels. This spring the four heads were seeded in one drill row (plat No. 135). The growth throughout the season was more vigorous than that observed on adjoining plats of the 20b series, and the heads were a trifle longer. This barley ripened the same date as the others.

Plats Nos. 136 to 142, hybrid No. 21a.—This is a 2-rowed, hooded, black barley, equally as early as 20b. It is a vigorous strain, having strong straw of medium length which bears compact heads. In addition to being thoroughly stable, this hybrid possesses all the desirable qualities of its Abyssinian male parent, minus the stiff beards. The heads are also larger and better filled at the tip.

Plats Nos. 143 to 152, hybrid No. 28a.—This is another black barley, 6-rowed, and 2 weeks later in maturing than the last-mentioned. Since it has not proved a desirable strain, it will be discontinued. A persistent but unsuccessful effort has been made to establish by selection a strain having deciduous awns. This series has been characterized by uneven growth, weak straw, though it had large, well-filled heads.

Plats Nos. 153 to 160, hybrid No. 44c.—Here is a hybrid which resulted from crossing Pamir and hybrid No. 20b, two of the earliest barleys ever tried here, both of which had strong straw. Furthermore, one of the grandparents on the maternal side is also Pamir. It is surprising that all of the offspring now in the fourth generation, having thus received two unit characters for earliness, should not only be late maturing, but possess weak straw. This lack of atavism is an apparent refutation of a most commonly accepted postulation.

Plat No. 161, Pamir (S. P. I. No. 18922).—This very early and very dwarf barley originally came from the high plateau of Central Asia. Since its only desirable attribute is earliness, several crosses have been made in the endeavor to combine this quality with some of the later maturing, but larger, beardless, sorts. As stated in the above paragraph, the results have not been satisfactory. However, a hybrid, No. 20b, from a different set of parents is practically as early as Pamir, so the end sought has been attained.

Plats Nos. 163, 165, 166, and 167.—Abyssinian, Manshury, Hansen, and Boehme are standard sorts that were grown as a check on the hybrids. All have been used as elements in hybridization. Of a large number of types and strains of barley tested here during the last 14 years, these four are among the best, yet none is so well adapted to this latitude as are several hybrids that have been evolved from these and a few others.

OATS.

Plats Nos. 171 to 182, hybrid No. 51a.—This most interesting hybrid is the offspring of a black, triflorous staminate, and a white, multiflorous, hull-less pistillate parent. The predominating type, in the F_2 generation, is multiflorous and hull-less and has black flowering glumes. The heads are much larger than those of the female parent, also earlier, in this latter respect being like the male. In plat No. 179 all heads were multiflorous, each having gray glumes and being denser than the black strain. In most of the plats a few heads resembled the male parent. When thoroughly stabilized this hybrid should be a valuable addition to the grain list of the North, as a breakfast cereal, and as a feed for chickens.

Plat No. 183, oat No. 394–1.—This oat, tried for the first time here, is a fairly vigorous type, but rather late. It is black panicled and awned, and its kernels are long and thin. It ripened September 1, and was not inferior to pedigreed sorts grown here, such as Finnish Black.

Plat No. 184, oat No. 395–1.—Another oat tried out this year. The type of head is "side," dense, and awnless, and it has black and very plump kernels. This oat possesses one very desirable attribute in its plumpness of kernels. It will be carefully pedigreed in order that a pure strain may be insured, and also will be used in crossing with other desirable oat varieties. This oat ripened August 31.

Plat No. 185, Swedish Postia (No. 406–1).—A white panicled, triflorous sort, which has medium-sized heads with fairly plump kernels. It was ripe August 25.

Plats Nos. 186, 197, and 219, hybrid No: 52a.—This is a strong-growing oat, having large, black, panicled heads. This hybrid resulted from a cross between a strong-growing, late, white oat and an early, smaller, black sort. Since black is dominant, F_1 and F_2 generations have been predominantly black with a sprinkling of white and gray heads. This hybrid is not stable as yet.

Plats Nos. 187, 188, and 223, hybrid No. 36a.—These plats were on the side of a knoll where the ground was so dry after seeding that germination was delayed. As a consequence, the stand was thin and late in maturing. These oats have done exceedingly well heretofore, producing some fine heads. The oats in this series are apparently stable.

Plats Nos. 189, 192, 199, and 221, hybrids Nos. 35b and 35e.—Since these plats were like the above-mentioned plats as regards moisture, the oats did not do well. The heads were small and the straw was short. At best these hybrids are not altogether desirable on account of lack of plumpness of kernel.

Plat No. 193, Black Tartarian.—Naturally a late oat, it was unusually so this year because of a dry seed bed. This statement is true of an adjoining plat of Banner oats. These varieties are grown simply to serve as checks on the behavior of their hybrid progeny, but neither will ever be a satisfactory sort for this part of Alaska because of their habit of late ripening.

Plat No. 195, Norwegian.—As usual, this oat matured early, being ready for harvest August 20. It is a black panicled type having pronounced awns and large, fairly plump kernels. Two of its progeny are very promising.

Plat No. 196, Yakutsk.—This is a very early variety of oat, having small heads and small kernels, white panicles and short straw. If grown on rich ground in order to force it to attain height, it lodges badly. This oat, which will prove useful in hybridizing, was ripe August 12.

Plat No. 198, Hull-less (No. 304-4).—This is the pistillate parent of hybrid No. 51a, described under plats 171 to 182, and is a medium late, multiflorous variety, useful principally in hybridization.

Plats of oats comprising Finnish Black, South Dakota, Hansen, and hybrid No. 25a were seeded, but did not make a satisfactory crop because of very poor ground. All were cut for feed. In another field comprising about 3 acres, several varieties of oats and barley were sown May 15. This land had been thoroughly summer fallowed and disked the preceding year and appeared to be in first-class condition to produce a crop, yet the grain came up very unevenly. By July 28 some of this grain was vigorous but so spotted that it was immediately cut for hay. Three weeks later a strong second growth had come up to a height of 2 feet, and the field was plowed, the succulent growth being turned under for a green manure.

The 5-acre field on the second bench, one-half mile from the river, was seeded May 12 with Finnish Black oats. The stand was practically perfect and the growth uniform. On August 30 it was harvested with binder (Pl. III, fig. 2), and later stacked and thrashed. The yield was 214 bushels, or an average of 43 bushels per acre. The only manure applied to this field was a light crop of peas and oats which were plowed under in August, 1918. A similar crop will be grown and plowed under next summer.

GRAIN HYBRIDIZATION.

A total of 97 heads of barley, wheat, and oats was cross-fertilized resulting in the production of 701 kernels of barley, 181 kernels of wheat, and 22 kernels of oats, which will be used for further studies in hybridization.

Six heads (Nos. 74a–b and 75a–b) of wheat when cross-fertilized with pollen from oats resulted in a catch of six kernels. By crossing four heads (No. 71a–d) of wheat with pollen from barley (No. 19b), three kernels were obtained.

LEGUMES.

As stated in previous reports, only the yellow-flowered alfalfa (*Medicago falcata*) has been able to stand the rigors of this climate. Three fields of it are doing well and producing a stronger growth every year notwithstanding the fact that the ground is poor. All of the alfalfa was seeded in rows 36 inches apart to permit cultivation (Pl. V, fig. 2). Planted thus, the land can be kept free of weeds with a minimum of labor. The frequent tilling has kept the surface in good tilth and stimulated growth. One-half of a 40-acre field made a particularly fine showing when in full bloom. Seed pods were set very freely, but owing to the comparatively low prevailing temperature very few ripened. Last year 11 pounds of clean seed was thrashed, a larger amount than was yielded this year. The present crop will be thrashed some time during the winter when the pods are frozen and easily broken.

The field of vetch (*Vicia cracca*), seeded five years ago, was plowed this summer. The underground rootstocks were alive and some feeble shoots were showing above ground, but weeds and wild grass were coming in so rapidly that the turning plow was used June 6; and the ground left lying fallow the rest of the summer. By fall the vetch had come up between the furrows and was making a fair stand. The land will be lightly harrowed in the spring and the vetch given a chance to "come back."

The field seeded last spring (1919) made a very fair growth. By the middle of August seed pods were forming, though they developed very slowly and failed to ripen. This vetch did splendidly for several years with regard to forage and seed production, and excelled *Medicago falcata*. Later results have been inferior.

Several acres were again devoted to peas, partly for seed production for future seedings and partly as a soil builder and green manure. This year the peas were seeded in rows, a two-horse grain drill being used for the purpose, and all but three of the feed holes were covered. This spaced the rows 32 inches apart and permitted frequent shallow cultivation. One field of 2½ acres was seeded May 6; another field of 1 acre, May 10. In both fields, the Alaska garden pea (station-grown seed) was used. Three acres was seeded with Irkutsk field peas May 16, and on one-fourth acre five varieties were planted May 17. These 5 were Golden Vine (No. 376–1), Early Large Gray (No. 366–2), Kaiser (No. 377–1), Small Yellow (No. 367–2), and Amraoti (No. 375–1). Two rows of Swedish tares (No. 333–3) were also planted. One of the main considerations with any variety of peas is whether or not it will ripen seed. Lacking in this one essential quality, it must go into the discard because in the majority of instances only enough seed for one or two trials is available. With regard to the above-mentioned peas, Nos. 366 and 367 are winners so far as seed production is concerned, but they are very dwarf, and, as a result, very undesirable for fodder or green manure. No. 376 was most vigorous of all, and enough of its pods ripened for a second trial. In a few years the time of ripening can be advanced, though this will be done at some sacrifice of size. No. 377 was next in size to Golden Vine, but did not ripen any seed. No. 375 was very little better than No. 377 in point of ripening, but was equally vigorous. None of the five varieties is so desirable as either the Alaska or the Irkutsk variety. Part of the acreage of these latter two was plowed under for soil improvement. The peas allowed to ripen were harvested by means of a sharp hoe which cut the vines at the surface of the ground. This was done quite rapidly. The vines were then piled and, as soon as dry hauled, placed on poles, and thrashed October 16. From 2½ acres of Alaska garden peas seeded in rows as stated above, 1,383 pounds of dry peas were secured. From one-eighth acre of Irkutsk, also grown in rows, 76 pounds resulted.

SEED PRODUCTION AND DISTRIBUTION.

The shortage of many kinds of vegetable seeds the last two years emphasized the desirability of growing here as many varieties as possible. Eight heads of Early Jersey Wakefield cabbage, complete plants, were set in boxes April 9; also roots of sugar beets, table beets, and carrots. The boxes and flats were kept in a window having southern exposure. On May 25, when all the plants were set out in the field, some of the cabbage was in bloom. The cabbage in particular did well. One of the largest plants grew to a height of 5 feet and was a mass of pods, most of which ripened. From this plant 5 ounces of seed was thrashed. Some of the others did nearly as well. The sugar beet and table beet tops grew very slowly, and though the earliest were in bloom by July 6, very little of the seed ripened.

Several plants of parsley were wintered in boxes a year ago. In the spring the boxes were put out of doors, where the seed stalks grew rapidly. About 50 per cent of the seed had thoroughly ripened by fall. Seed of several varieties of garden peas, Pe-tsai, turnip, parsnip, spinach, and radish was harvested. Fruits of the tomato, pepper, muskmelon, and cucumber were allowed to ripen in the greenhouse and hotbeds and the seed was saved.

Many requests for vegetable seed were received, some of which could not be fully supplied, since the usual quota of congressional seed had not been sent in. This, presumably, was due to a general shortage of garden seed occasioned by the war. Fortunately, the station had on had a variety of vegetable seeds from the previous year and these, supplemented by what was grown on the station ground, sufficed to supply each applicant with a limited assortment.

Numerous calls came in also for wheat, oats, and barley, which were supplied in varying small amounts up to 4 pounds, free of charge. Strawberry plants were distributed to all who requested them. Seed potatoes were again rather scarce at Rampart and at other interior points, and the few hundred pounds available at the station were quickly sold.

THE GARDEN.

The garden plat dried off early because of the light snowfall and southern exposure, and seeding began May 10. Despite the comparatively early start, garden crops, like field crops, made a very slow growth during the early part of the season. This was true particularly of peas and potatoes. Later, conditions were more favorable, and all garden truck was little, if any, below normal by the middle of July. Peas that were backward through June bore heavily throughout the latter half of July and August. The following were grown: Premium Gem, Nott's Excelsior, Alaska, Horsford's Market Garden, Prince of Wales, Extra Early, American Wonder, and Gradus. Some of the first-maturing pods on all varieties were allowed to remain and ripen. Pods on Alaska ripened first and most abundantly, and Prince of Wales least. For medium late sorts, Gradus and Horsford's Market Garden, respectively, are very excellent, both as to quality and to quantity.

In previous reports the excellence of Hanson lettuce has been noted. This year was no exception. Where the plants were allowed sufficient room, large, solid heads were formed, some weighing 2½ pounds (Pl. VI, fig. 1). These were crisp, tender, and well flavored throughout. Prizehead is earlier in maturing than Hanson, but lacks its quality and size. Icicle is also excellent but did not head so firmly nor have so delicate a flavor or texture as Hanson. A great deal has been said lately in various agricultural publications of the excellence of Pe-tsai, or Chinese cabbage, as a salad plant or as greens. To test its desirability as such a substitute and its adaptability here, a row was seeded May 12. It came up May 23, two days earlier than lettuce, and grew vigorously from the start. June 15 the first leaves were cut and when cooked made palatable greens. Uncooked, the leaves had a very mild, pleasant flavor, but lacked the tenderness of lettuce. By July 3 the plants were sending up seed stalks which bloomed and ripened some seed. Another seeding was made June 25. These later plants also ran to seed and were in bloom September 10. One great

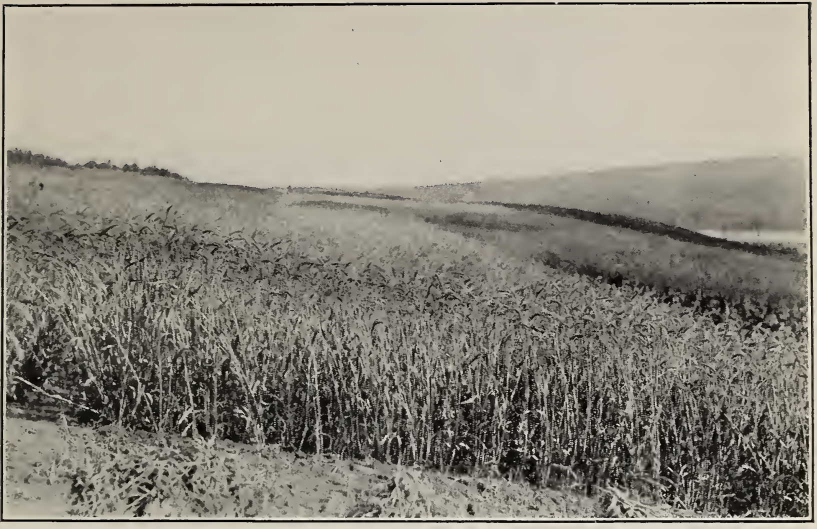


FIG. 1.—BARLEY HYBRID NO. 19B, RAMPART STATION.

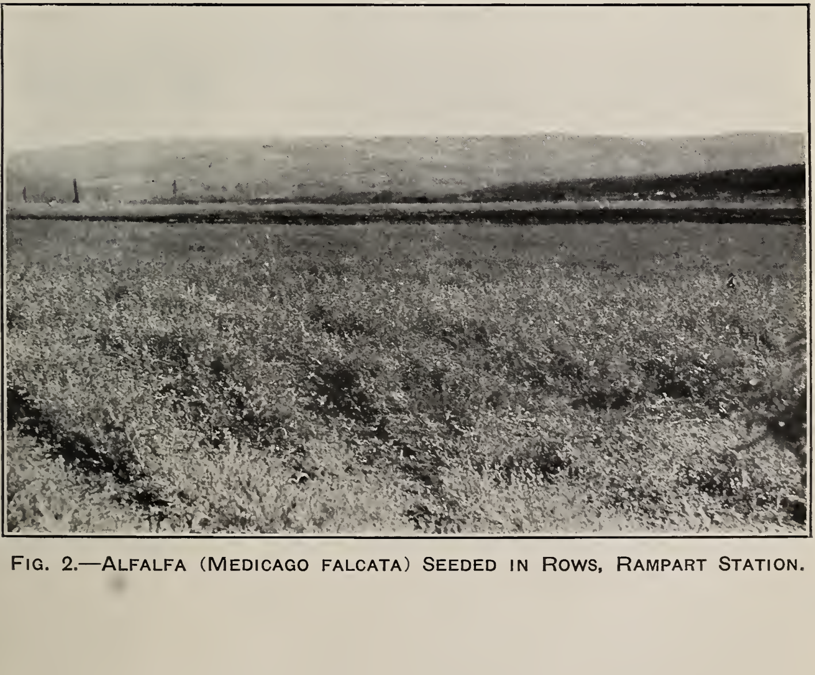


FIG. 2.—ALFALFA (MEDICAGO FALCATA) SEEDED IN ROWS, RAMPART STATION.

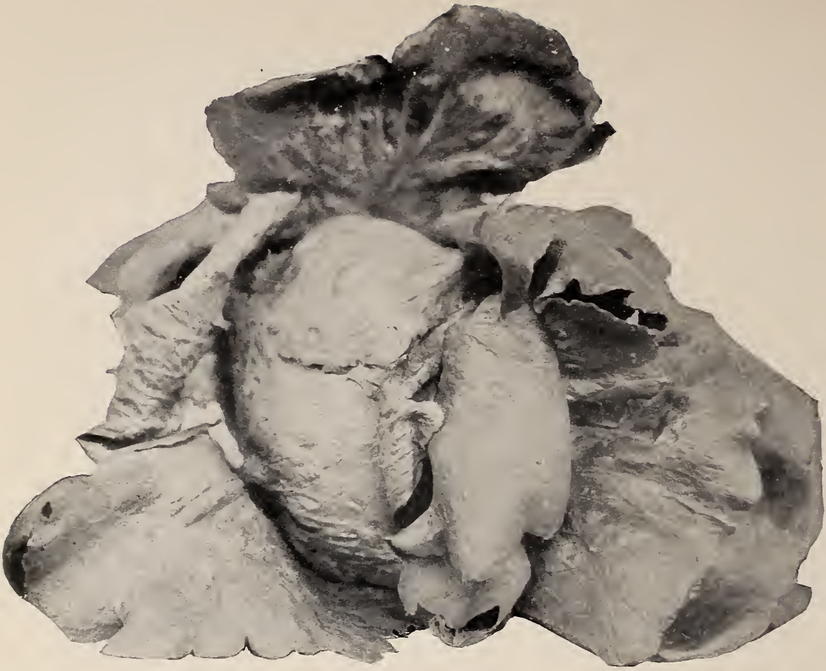


FIG. 1.—HANSON LETTUCE, 2½ POUND HEAD, RAMPART STATION.

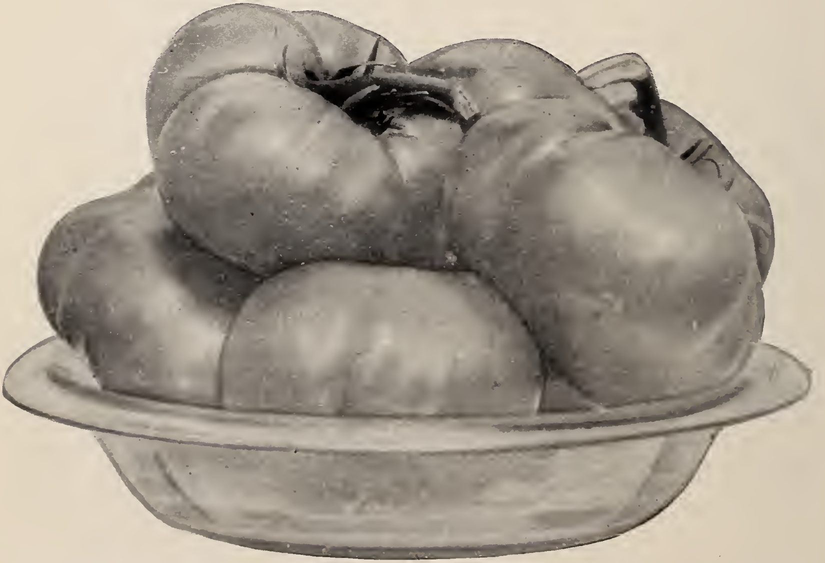


FIG. 2.—PONDEROSA TOMATOES, EACH WEIGHING 1 POUND, 10 OUNCES, RAMPART STATION.

drawback to Pe-tsai is that as it belongs to the Cruciferæ family, it is subject to attack by root maggots. Several plants were killed by these pests. These tests seem to warrant the conclusion that young beet tops and Swiss chard are superior to Pe-tsai for cooked greens, while for salads, lettuce is to be preferred.

Several varieties of sugar beets were grown, among them being Champion White and two unnamed varieties obtained from the United States Department of Agriculture. All grew vigorously and produced fair-sized roots. All beets, either sugar, half-sugar, or table varieties, ran to seed persistently this year, more so than ever before. The seed stalks were cut back repeatedly, and where this was done early and often enough the roots grew to average size. However, such roots were inferior in texture. A number of complaints have been received from various places in regard to this defection of beets, and in one case of turnips. Spinach also has proneness for seed production here. This year, for the first time, 75 per cent of the celery started seed stalks, Golden Self-Blanching being a worse offender in this respect than either Giant Pascal or Winter Green. Close observations are being made to ascertain just what are the chief causes for this premature running to seed. It is a rather well-known fact that this tendency is inherent in some celery seed, and doubtless the soil and the season are the other main contributing causes.

Both cabbage and cauliflower made a fair crop. Root maggots caused but small loss among the cabbage. Several cauliflower plants, which are much more subject to root-maggot attack, were killed. The Early Jersey Wakefield (from station-grown seed) produced fair-sized, solid heads, none so large, however, as Copenhagen Market. It is worthy of note that immature heads keep much longer than the large, matured ones. Cabbage, to be stored successfully, should be kept as near the freezing point as possible and also where the circulation of air is good. These conditions are seldom to be had in a house cellar. In the station root cellar, where temperature and ventilation can be more carefully controlled, cabbage is kept until April and May with very little loss of immature heads. Cauliflower and Brussels sprouts require the same storage conditions as cabbage and may be kept until the Christmas season and sometimes later Brussels sprouts should be more generally grown. This vegetable has won a permanent place in the station garden. Though similar to cabbage, it is tenderer and milder when cooked.

Owing to the cool, cloudy weather that prevailed the past summer, only partial success was attained with tomatoes, squash, beans, and corn. A new variety of squash, called Mandan, gives promise of good results in warmer summers. The yield from two hills filled a couple of quart jars with a product fully equal to outside pumpkins.

Excellent tomatoes were grown in the greenhouse. Ponderosa in particular did well, four of the largest fruit weighing 6½ pounds (Pl. VI, fig. 2). Bonny Best, Earliana, Millett's South Dakota, and two hybrids from California were the other varieties grown in hotbeds. The muskmelons, Emerald Gem, Netted Gem, and Cassaba, did splendidly. Many fruits ripened thoroughly and were a treat to all who ate them.

STRAWBERRIES.

The strawberries scored another big success. Several gallons were picked from two small plats. The picking season extended from July 24 to August 20. Three new plats were started and are doing well. Reports from several who were supplied with strawberry plants a year ago last spring (1918) stated that although the plants made very splendid growth that summer, a majority winterkilled. Very little injury from frost occurred at the station during the same period. Since temperature conditions are not widely diverse in the region supplied with plants, it is obvious that importance of location of the plat, with reference to snow protection, may have been overlooked. A covering of snow is vital, particularly during April and early May. If the plants are exposed at that time to the drying action of sun and wind very few will survive. Plants should, therefore, be set where the snow will not be blown away during the winter storms; or, if such an exposed place must be used, coarse brush litter should be scattered over the plants to hold the snow. It is well, also, to avoid excessively wet ground. Many, if not all, of the plants will rot if covered by water for any length of time after the ground has thawed in the spring.

POTATOES.

Nineteen varieties of potatoes were grown in 10 hill plats for comparative yield tests, and a few rows of Irish Cobbler for distribution and table use. The ground has a southern exposure and was in excellent condition when planted May 15 and 16. Although the seed was well green sprouted, all varieties were very slow in coming up and growth was retarded owing to the cold winds. By July 11 the earliest were in bloom, and from then on the vines grew rapidly and appeared thrifty, though the soil was not nearly rich enough to produce heavily. The potato vines appeared perfectly healthy throughout the season. The first frost severe enough to kill the tops occurred on the night of August 31, the temperature being 28° F. On September 15 the potatoes were dug, the names of varieties and yield per 10 hills, in pounds, being as follows: Early Six Weeks, 27; Old's Select Rural, 20; Roosevelt, 15; Green Mountain, 12.5; Old's Improved Peerless, 16.5; Bliss Triumph, 21.5; Clark Seedling, 17;

Pioneer, 16; Red River Early Ohio, 10; Noroton Beauty, 18; Red River Triumph, 15; Gold Coin, 13.5; White Star, 16.5; Red River Cobbler, 12; Irish Cobbler, 13.5; Carman No. 1, 11; Mammoth Pearl, 17; White Plume, 14; and New Queen, 14.

FLOWERS.

The work with flowers increases a little each year as the means of handling the plants improve. Of the 50 or more reliable sorts grown some proved disappointing in their appearance, while others far surpassed all expectations. The location of the various varieties is changed from year to year for experimental purposes, and it is most interesting to note the effect on the growth and bloom of the plants.

The following flowers were the most noteworthy successes this year: Stocks (10-weeks) grown for the first time in the warmest, sunniest location on the station grounds, produced such remarkable blooms that visitors from the States pronounced them the finest they had seen. Asters grown for the first time where they were sheltered from the wind were so heavy with magnificent flowers that the branches broke off in spite of the fact that bouquets were constantly cut from them. Dahlias from seed were the finest ever grown here. Rich, red blooms about 4 inches across appeared on the plants throughout the season. The plants were very small when set out and the ground was so cold that boiling water had to be poured into two of the holes to melt the ice; yet not a plant turned color, but all kept their rich green and continued to flourish. Night protection given them through the late August frost period saved these beautiful plants another three weeks. The phlox bed, though a mass of growth, was not pretty, only a few of the colors being attractive. Great care and study must be given to get richness of coloring in this plant. Pansies and snapdragons gave their usual splendid growth and wealth of beauty. Godetia plants started off well, but the cold, raw weather of June was too much for them and all but two succumbed. The favorable season of the previous year had produced a marvelous bed of these attractive flowers. Salpiglossis remained inactive through June, then grew rapidly, and when the killing frosts came they had beautifully matured and were rich in coloring.

As stated in the last report, great effort is being made to improve the sweet pea in this valley. This year the blossoms were way above average in color and size, but the vines were not so luxuriant as they should be. However, the marked improvement is encouraging.

A border that attracted special notice was composed of candytuft, sweet alyssum, and yellow California poppies, a particularly luxuriant growth from seed sown in the open ground in May. All the other annuals as usual did splendidly, except the marigolds, which were below standard, not only at this station but at other places reported. Several varieties of perennials are being wintered for trial. No cosmos obtained this year was a success in point of early blooming, but some promising looking seeds have been secured for next year.

GREENHOUSE PLANTS.

Work with under-glass production is both interesting and disappointing at Rampart. From late November until almost the last of January the sun disappears entirely and the days are dark and gloomy, and since the months of October and November are generally overcast, the plants are left without the light and warmth so much needed by them. The result is most disastrous to hothouse plants, but very hardy things get through, taking on new life when the sun's rays return. Repeated trial plantings have been made with cinerarias, gloxinias, and primulas, both from seeds and young plants sent in, but no matter how sturdy the plants are in September all have succumbed by the first of the year. The effort will be continued with the hope of finding a way to carry them through the trying days. Vines grow very well under these conditions. The wandering jew was more than 8 feet long this season.

REPORT OF WORK AT FAIRBANKS STATION.

By M. D. Snodgrass, *Assistant in Charge.*

WEATHER CONDITIONS.

The climate is the most variable factor with which the farmers have to contend in the Tanana Valley. The soil has proved productive under favorable climatic conditions. The greatest problem confronting the farmer of the interior of Alaska is the management of his soil so as to conserve moisture sufficient to grow grain crops successfully on thawed lands. At present this problem is not vital with respect to hillside land which has been newly brought under cultivation, or deeply frozen land where the subsoil gives up its moisture in sufficient amount to meet the need of growing crops during even the driest seasons experienced in this region, but it is all important as regards thawed lands that have been under cultivation for several years. The annual precipitation for the past nine years is 11.77 inches, which is not sufficient to grow grain crops continuously on thawed lands. However, this amount will suffice where the frozen reserve in the subsoil can be counted on.

The past season was the driest known to the farmers of the interior. In this vicinity the snowfall was but 12 inches for the past winter, 1918–19, and the precipitation during eight months, September 1 to April 30, was only 1.53 inches. Fortunately, the precipitation was normal for the following four months.

The winter was milder than normal. The mean temperature for December was —7.22° F., which is 4° warmer than the nine-year average. The thermometer ranged between 28° above and 50° below zero. January was normal in temperature and lower in precipitation. The highest reading was 26° above and the lowest 56° below zero. February and March were slightly colder than normal and without precipitation. April was slightly warmer than normal. The snow had disappeared from the southern slopes by April 7 and from the northern slopes and the woods by April 14. By April 22 the frost was sufficiently out of the ground to enable the working of the surface for the conservation of moisture, and by April 26 the ground was ready for disking. Unusually favorable weather for farm work continued throughout May. On May 17, 0.8 inch of rain fell, followed by light showers during the next 12 days. All grains seeded early in May germinated readily, but made slow growth. June weather was unfavorable to farm crops, the mean temperature being 5° below normal, and frequent showers and westerly winds prevailing during the month. All crops were at a standstill for about three weeks. July was a favorable month, with normal precipitation of 2.79 inches, falling in frequent showers, and with 24 days of sunshine and a mean temperature 3° warmer than normal. August was warmer than normal and 1 inch below the average in precipitation, which factors materially aided ripening of the grain crop. These four months had only 25 cloudy days. The last killing frost in the spring came May 8 and the first killing frost of the fall came September 1. This did little damage to grain, practically all grain on the flats having been harvested, but potatoes on the valley lands were damaged considerably.

Cloudy weather and light showers during September interfered with curing grain in shock and the hay crop generally. The early freeze up of October 2 aided in drying grain in shock, so that thrashing could be done before the snow came. The heavy freezing of that date made fall plowing impossible, and caught a number of farmers with some potatoes still in the ground. The freeze up was 15 days earlier than normal, otherwise the temperature ranged normally through October, November, and December, 1919. The snowfall for the three months was 26.3 inches, which is above normal.

STATION WORK.

The usual routine work, which consists of thrashing, cleaning, and preparing the grain for storage or for distribution among the farmers of the interior, grading and sorting potatoes, caring for live stock, repairing and overhauling machinery, and sawing and hauling wood, occupied the entire time of the station force during the winter months.

On April 22 field work began with the pulverizer and smoothing harrow to conserve moisture. On April 25 the tractor with double disk was started, and all fields were disked and harrowed by May 5. Seeding was begun May 7 with two grain drills, one hitched to the tractor with the surface packed in tandem (Pl. VII, fig. 1) and the other with horses. Both drills were kept busy until May 15, when field seeding was finished. On all fields seeded with the horse drill the surface packer was used to insure firming the soil about the seed grain, with the result that an even stand of all kinds of grain was secured. By this practice the uneven germination observed in former years was overcome.

Small increase and breeding plats were seeded between May 11 and 20, also the rotation plats. Potato planting began on May 23 and was finished May 26. Immediately after the field was seeded the tractor with gang plow was started on hay land and summer-fallow land, and continued until all cultivated lands were plowed.

Three acres of stump land was cleared and seeded to grain hay. Two acres was cleared by hand tools and one acre by means of the tractor used as a stump puller. Two men were required to handle the root hooks and two to clean up the small roots and pile the stumps for burning. It required 10 hours for the force of five men and the tractor to clear an acre of south-slope stump land which had been cut over five years before. The roots were sufficiently rotted for an 8–16 horsepower tractor to remove at the first pull most stumps under 10 inches in diameter. Larger stumps required two and three hitches, some of the roots breaking off. The cost is little more than half that of clearing by hand. Green stumps would require twice the power, or even more to insure rapid work.

GENERAL IMPROVEMENTS.

In addition to the clearing of three acres and enlarging the pasture, repairs were made to the roads, buildings, and fences. Building-repair work consisted of lining the office building with shiplap, removing and renewing sills and foundation of the log portion of the superintendent's cottage, renewing the entire floor and putting plaster board on all walls and ceilings and calcimining them. The root cellar was remodeled by excavating and walling up with logs an additional cellar room 14 by 20 feet for fuel storage and heating plant below the sorting room, and by replacing heavy stringers and supports under the ceiling of the back 40 feet of the cellar.

A shed 19 by 20 feet was added to the blacksmith shop for a machine shop and tractor room, with entrance through the blacksmith shop.

The water system was extended from the well to the barn and cottages. The windmill purchased last year was erected and the lower part inclosed for a pump house. The woodhouse was moved and joined to the pump house. A small cellar for a water-pressure tank was dug and walled with concrete beneath the woodhouse, and drain pipes were laid from the two cottages and water-tank cellar to connect with a cesspool planned for next spring. The kitchen and bath fixtures have not been purchased, but are awaiting the completion of the cesspool.

The renewal of fence posts on 200 rods of old fence and restretching of the wire was done at odd times during the season; also the setting of posts for 150 rods of new fencing to enlarge the pasture and serve as a partition through the woodland pasture. The wire was received late in October (1919).

Road repair work was done with the tractor and a road grader. One mile of the station roads was graded during the early fall. The roads were widened and good crown made to insure good drainage for the roadbed. Considerably more road work is necessary before machinery can be moved safely from field to field. More trees and stumps require grubbing and the roads need to be widened still further.

GRAIN CROPS.

All grain crops, with the exception of rotation plats, were grown on fallow land, potato land, or green-manured land. Field work was possible at an earlier date than usual and all crops were seeded in good season. The soil was dry but cold, due to the unusually light snowfall and deep freezing of the past winter. Favorable weather for plant growth did not come until July, and continued from that time on until grain was matured.

WHEAT.

Spring wheat was successfully grown again this season. On 13.8 acres, 6.33 acres of which was south slope and 7.5 acres north slope, average yields of 27.3 bushels and 17.3 bushels per acre, respectively, were obtained. Both Romanow and Siberian No. 1 matured perfectly on south slope and bottom land. On two adjacent 2.3-acre plats, under the same cultural conditions, Siberian No. 1 yielded 27 bushels per acre and required 110 days to mature, while Romanow yielded 30 bushels per acre and required 120 days to mature. Both wheats are plump and will grade well. The former will probably grade No. 1 Northern hard. Head-row tests were made with nine varieties of wheat.

OATS.

Three varieties of oats were grown as field crops, 13 varieties in variety tests, and 4 hybrid oats and 9 standard varieties in head-row tests. Small increase plats of six varieties of the more promising oats from former head-row tests were also grown.

Canadian oats rank first as a field crop this season. From 7 acres of the flat frozen land, which for three seasons has been cropped with oats alternated with summer fallow, 555 bushels of oats was thrashed, or a yield of 79.2 bushels per acre. The oats were seeded May 7, harvested September 3, and thrashed from the shock October 18. All field work was done with the tractor (Pl. VII, fig. 2), except the work of hauling the bundle grain to the thrasher. A total of 666 bushels of this variety was grown from 9.5 acres, making an average yield of 70 bushels per acre.

On three-quarters of an acre an unknown variety of white oats of promise, obtained from a nearby farmer, was grown alongside the Canadian under identical conditions and yielded 46.8 bushels, or at the rate of 62.4 bushels per acre. Both varieties were grown on adjacent plats in the variety test where the Canadian made a fourth larger yield. One and four-tenths acres of South Dakota oats grown on land cropped to grain two previous seasons made a yield of 43 bushels per acre.

The variety test plats for oats were seeded on clover land which had been fall-plowed, double disked in the spring, and harrowed before seeding. A portion of the clover plat before being plowed was fenced temporarily for hog pasture during the late summer, resulting in a marked difference in the plant growth this season, due partly to moisture in the ground and partly to available plant food. The ground contained more moisture where the clover had been pastured down than where it had been left growing until plowed under, as was shown by all variety plats on both sides of the fence line. The oats grown on pastured land did not suffer from the drought in June as did that grown on land not pastured. It therefore becomes necessary to divide the variety test plats at the fence line, placing plats Nos. 1 to 7, inclusive, on pastured land, and 8 to 13, inclusive, on nonpastured land. Plats Nos. 2, 3, and 4 were not included in the test on account of the low germination of the seed. All three varieties were too late to mature in this region. The results of the variety test are given in the table on page 50.

The Hansen oat has proved a fair yielder of both grain and straw, but it is too late in maturing to be grown successfully as a grain crop in this region. Finnish Black oat again takes a lower rank in production than several other varieties. Alaska-grown seed of Swedish Select oats made a fair showing in both grain and straw

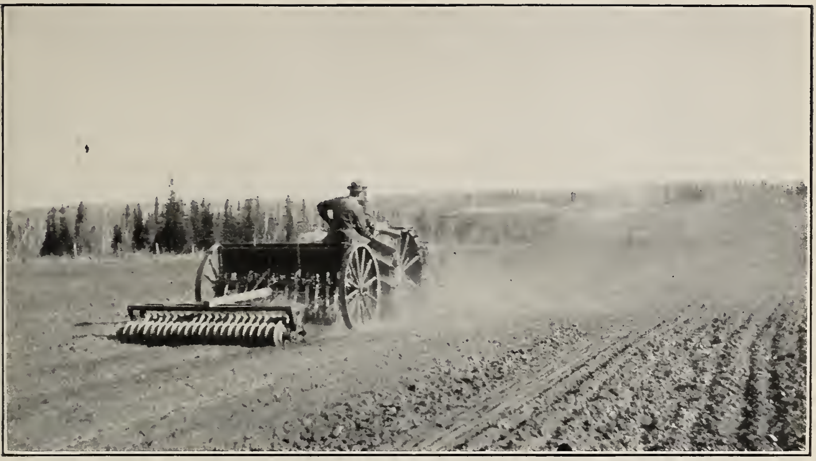


FIG. 1.—GRAIN DRILL AND SURFACE PACKER IN TANDEM.

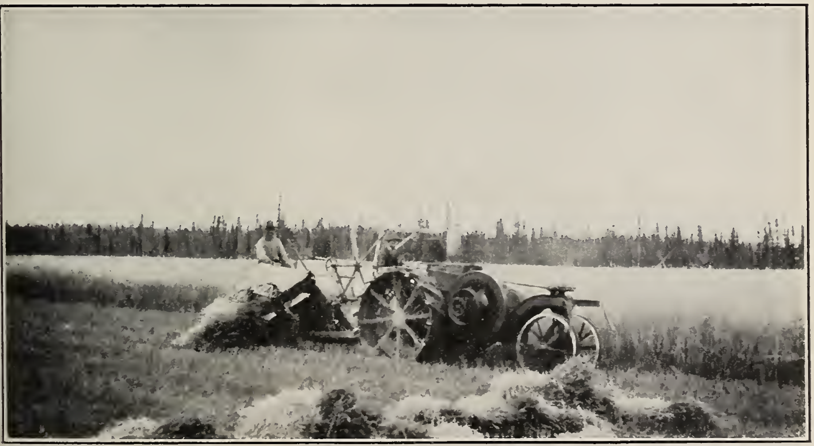


FIG. 2.—HARVESTING CANADIAN OATS.

FARMING WITH TRACTOR AT FAIRBANKS STATION.

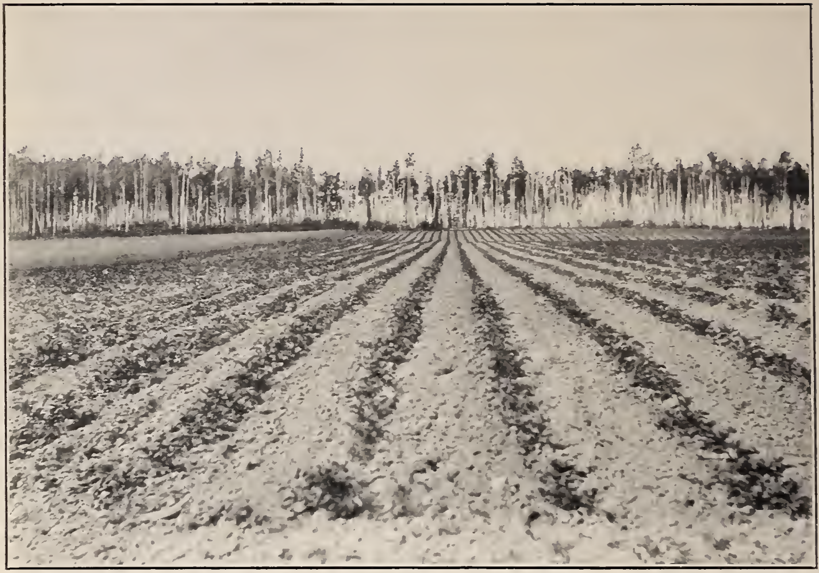


FIG. 1.—POTATO PLATS, JULY 9, 1919, FAIRBANKS STATION.

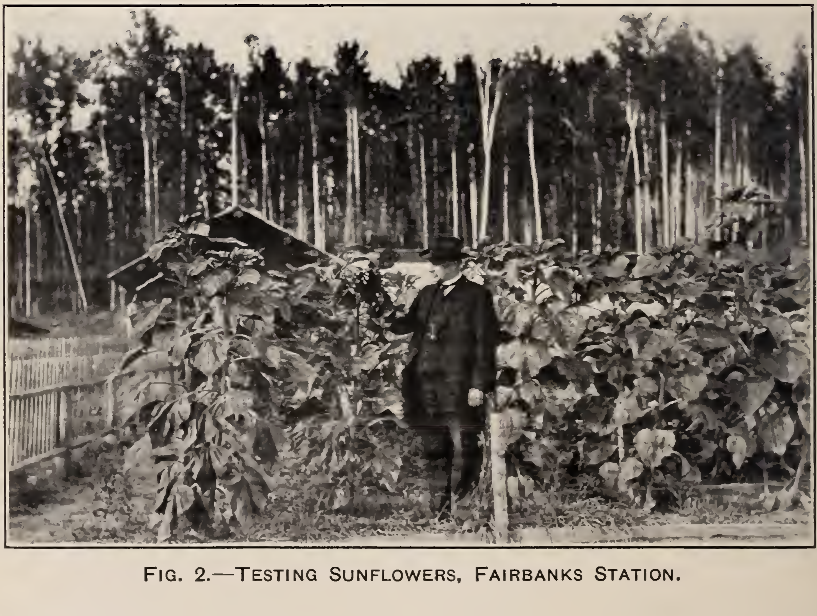


FIG. 2.—TESTING SUNFLOWERS, FAIRBANKS STATION.

yields. Swedish Select grown from imported seed made good yields of both grain and straw. The quality of the grain was superior to that from native-grown seed.

Of the six varieties grown on nonpastured land the Norwegian Black oats gave the highest yield in both grain and straw, with the Canadian a close second, and the quality of the grain of the latter was far better than that of the former variety.

Good yields were obtained from the small increase plats of the hybrid and standard varieties of oats grown from last year's head-row seed. Nothing of special importance was shown in the oat head-row tests this year.

BARLEY.

Two varieties of barley were grown as field crops on a small area, 7 varieties were grown in the variety test, 14 in small increase plats, and 9 hybrid barleys and 14 standard varieties in head-row tests. Beardless barley, S. P. I. No. 19852, was grown on 5 acres of north hillside land, and gave a yield of 21.4 bushels per acre. The barley was seeded May 9, harvested September 3, and thrashed from the shock September 17. The barley matured normally and is of good quality.

Hull-less barley, S. P. I. No. 19851, grown on four-tenths of an acre of south slope land, yielded at the rate of 21 bushels per acre (60 pounds to the bushel). This variety was seeded May 14, harvested August 22, and thrashed from the shock September 15. This barley is to be recommended for this region.

The variety test of barley was seeded on land grown to root crops for two years previous. Volunteer turnips from the seed crop of 1917 proved to be a weed pest and made it necessary to hoe all the plats. Seven varieties of barley were tested, all of which made fair yields, as will be seen from the table on page 50. The hull-less variety, S. P. I. No. 19851, ranks first in production among the beardless varieties. The Wisconsin pedigreed barley gave the largest yield. This is a medium early variety, being both bearded and hulled and having medium-sized heads and stiff straw. The hybrid No. 28a–1 is a promising barley and is beardless and hull-less as well as medium early.

Variety test of oats, 1919.[1]

Plat No.	Variety.	Date seeded.	Stand.	Date headed.	Date matured.	Number of days to mature.	Size of plat.	Yield of grain.	Yield of straw.	Yield of grain per acre.	Yield of straw per acre.	Remarks.
			Per cent.				*Acre.*	*Pounds.*	*Pounds.*	*Bushels.*	*Pounds.*	
1	Hansen	May 13	90	Aug. 8	Sept. 12	122	0.036	68	167	59	4,639	A fair yielder but too late in maturing.
5	Finnish Black	...do....	100	July 28	Aug. 21	100	.071	75	150	33	2,112	A fairly early oat but light in grain yield.
6	Swedish Select (new selection).	...do....	100	July 30	Aug. 25	104	.036	44	111	38	3,084	An excellent oat, plump and heavy.
7	Swedish Select (Alaska-grown seed).	...do....	98	Aug. 1	Sept 1	111	.146	222	328	47.4	2,246	A fairly good oat for this region.
8	Norwegian Black	...do....	85	...do....	Sept. 5	115	.146	193	207	41.3	1,417	A fairly heavy yielder of grain.
9	Hybrid No. 35e-1	...do....	95	...do....	Sept. 1	111	.071	64	91	28.1	1,282	Only medium in yield and quality.
10	South Dakota	...do....	95	Aug. 2	Sept. 5	114	.146	100	170	21.4	1,164	Quality fair; a light yielder.
11	White "McIntyre Oat." (Variety unknown.)	May 12	95	...do....	Sept. 4	114	.071	66	104	29	1,464	Very plump and heavy oat.
12	Canadian	...do....	98	...do....	...do....	114	.146	178	162	38.1	1,109	An oat of good quality and adapted to this region.
13	Sixty Day	...do....	98	July 28	Sept. 1	112	.146	159	101	34	691	Oats of only fair quality.

[1] The oats on plats Nos. 8 to 13, inclusive, suffered from drought early in June owing to the lack of moisture in the ground where the clover crop of 1918 had not been pastured. The oats apparently did not suffer from lack of moisture on plats 1, 5, 6, and 7 where the clover had been pastured. Therefore, the first four plats can not be compared with the last six in yields.

Variety test of barley, 1919.

Plat No.	Variety.	Date seeded.	Stand.	Date headed.	Date matured.	Number of days to mature.	Size of plat.	Yield of grain.	Yield of straw.	Yield of grain per acre.	Yield of straw per acre.	Remarks.
			Per cent.				*Acre.*	*Pounds.*	*Pounds.*	*Bushels.*	*Pounds.*	
1	Hull-less, S. P. I. No. 19851 (new selection).	May 13	95	July 24	Aug. 21	100	0.065	61	84	15.6	1,292	A fair and early barley. Crop slightly damaged by rabbits.
2	Hull-less, S. P. I. No. 19851.	...do....	95	...do....	...do....	100	.065	83	76	20.1	1,169	A fair and early barley.
3	Wisconsin Pedigree (bearded).	...do....	100	July 28	Sept. 1	111	.065	99	171	31.7	2,630	A promising variety.
4	Beardless, S. P. I. No. 19852	...do....	80	July 26	Aug. 28	107	.065	72	86	23.0	1,323	Well adapted to the interior.
5	.....do	...do....	80	...do....	...do....	107	.065	76	69	24.3	1,061	Do.
6	Beardless, hybrid No. 4a-1	...do....	80	July 28	Sept. 6	116	.065	63	86	19.8	1,323	A medium producer.
7	Blue Beardless, hybrid No. 28a-1.	May 14	85	Aug. 1	Sept. 8	117	.060	68	147	23.6	2,450	A fair producer; straw, stiff. One-half hull-less.

The small increase plats of hybrid and standard varieties make good yields. All were seeded under field conditions with the horse grain drill in rows 220 feet long and 6 inches apart, with alleyways 18 inches wide.

The head-row tests contained some new hybrid barleys from the Rampart Station, which show some very desirable qualities in the way of productiveness, early maturing, and general adaptability to conditions obtaining in this region. All the desirable hybrid barleys were saved for increase planting.

CROP ROTATION.

Crop rotation, as outlined in the report of last year, in which a four-year rotation is run with red clover, oats, potatoes, and wheat with check plats, in duplicate, of oats and wheat grown continuously, and duplicate plats grown to clover one year in four and to oats and wheat, respectively, for three years. The effect of clover on the land is shown to be very favorable in the oat yields for the past two years. Oats following clover the first year gave a yield of 47.5 bushels against a yield of 25 bushels per acre on land in grain the two years previous. Oats on the same plat this season gave a yield of 44.8 bushels per acre against a yield of 27.6 bushels on grain land. Oats on plat following clover the first year suffered from drought this season due to the heavy moisture demand of the clover last year and the light precipitation this year.

GRAIN HAY.

Grain hay consisting of wheat, oats, and barley was grown on 13 acres of old land, 10 of which were north-slope fields; 2 acres bottom flats, and 1 acre south-slope fields; also 3 acres of new clearing on the south slope. An average yield of 1 ton per acre was obtained. The season was unfavorable for curing hay at harvest time, but by the use of drying racks practically all was saved.

POTATOES.

Potato planting began May 23 and was finished May 26. Experiments in planting first and second-grade seed were carried out with six varieties, and third-grade seed of three varieties was also planted. Sixteen varieties were grown under field conditions and 15 other varieties were planted to determine their adaptability to interior conditions. The potatoes were slow in coming up and grew slowly until the middle of July (Pl. VIII, fig. 1). In some localities a light frost occurred June 9 and again on June 21 and frosted the earlier plantings. The lack of moisture was apparent on all the potato fields on old land, more especially on grain land. The tubers set well but failed to attain the usual size. The percentage of second-grade tubers and culls was larger than usual. The quality of the potato is exceptionally good.

ROOT CROPS.

The root crops consisted of approximately one-half acre of carrots, sugar beets, and Petrowski turnips, about an equal area of each. The sugar beets and carrots made a light yield of undersized roots. The turnips made a fair yield. The total crop amounted to 3 tons.

LEGUMES.

Canadian field peas were grown for seed and for hog feed on one-half acre of south-slope land with fair success. The peas were drilled in rows 2 feet apart and cultivated three times with a five-tooth cultivator before they began to fall over. The seeding was done May 14. Bloom appeared July 10 and a good setting of peas resulted, three to eight pods maturing on every plant. The plants were cut for hay September 12 and placed on racks to cure, and a portion was thrashed for seed. The yield of ripe peas was low. A small plat of the Alaska pea was grown for seed. These did not make very good growth, but ripened before frost.

Red clover was grown fairly successfully again this season on the rotation plat and on one-half acre of the south-slope field as a green-manure crop.

Alfalfa from a miscellaneous seed assortment was grown on a one-half acre south-slope field for green manure. It came in good stand, but made slow growth.

Alfalfa seed was matured in small amounts from the breeding plats of Hansen's Semipalatinsk and North Swedish seeded in 1915. The former is proving quite hardy and has withstood four winters. A few plants of the North Swedish remain and grow with vigor. Little or no type has been established in this variety either in foliage or flower. Some plants grow upright while others are recumbent. Hansen's Cherno and Cossack varieties seeded the same year have nearly killed out.

Small plats of Grimm alfalfa and *Medicago falcata* were seeded in rows May 21. These came in good stand and made only fair growth. A few blooms appeared late in August.

SUNFLOWERS.

A test of sunflowers was made, many of the plants growing 6 feet tall. (Pl. VIII, fig. 2.)

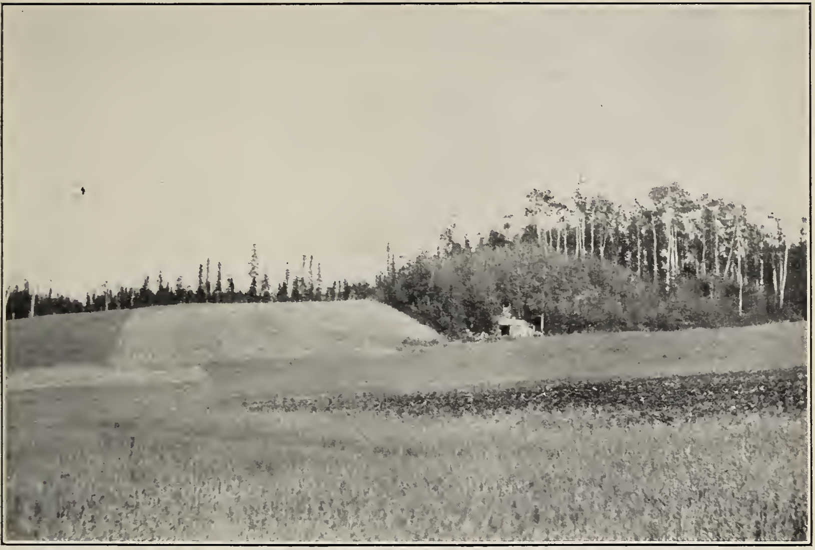


FIG. 1.—GRAIN FIELDS NEAR FAIRBANKS, L. J. ERICKSON'S RANCH.

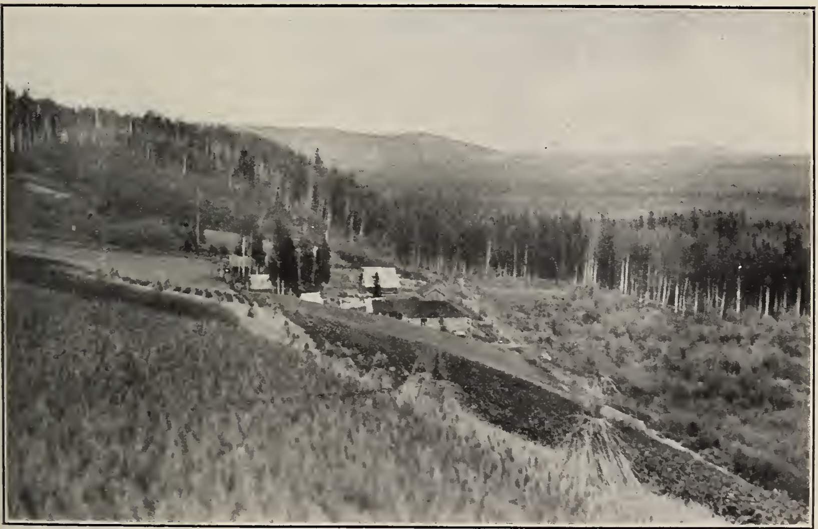


FIG. 2.—HILLSIDE HOMESTEAD, H. A. LAXELLE, AUGUST 22, 1919.

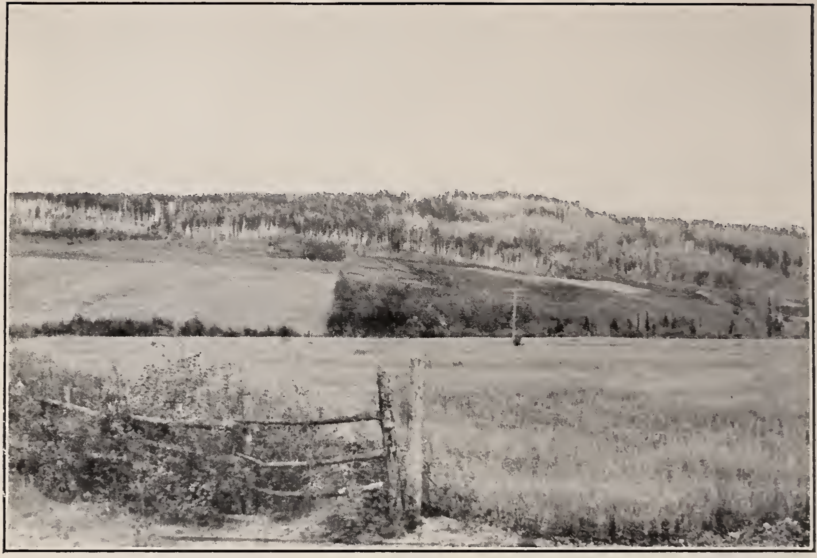


FIG. I.—OAT FIELD, M. SABINE'S RANCH.

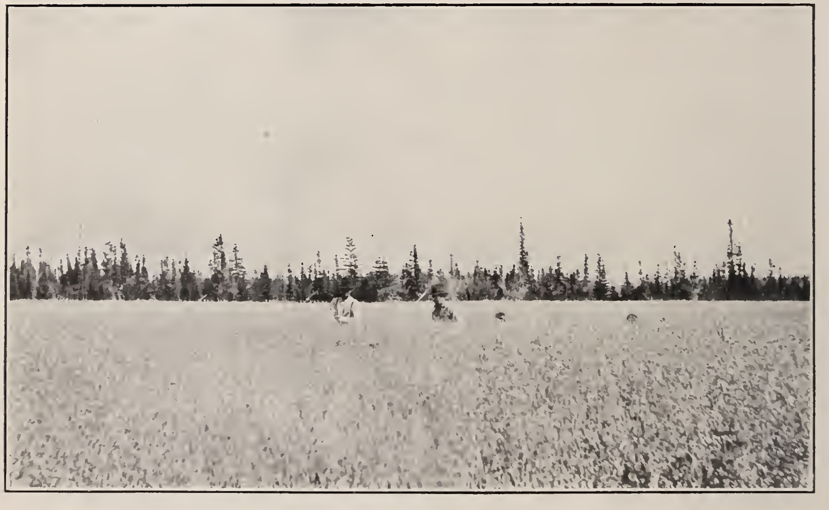


FIG. 2.—CANADIAN OATS ON FALLOW LAND, JULY 26, 1919.

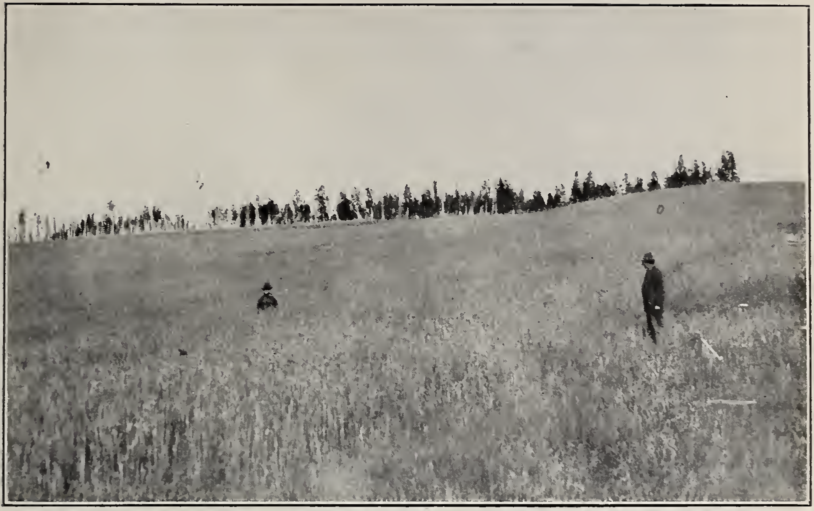


FIG. 1.—SIBERIAN WHEAT, SEEDED JUNE 5, 1919, H. NELSON'S RANCH.

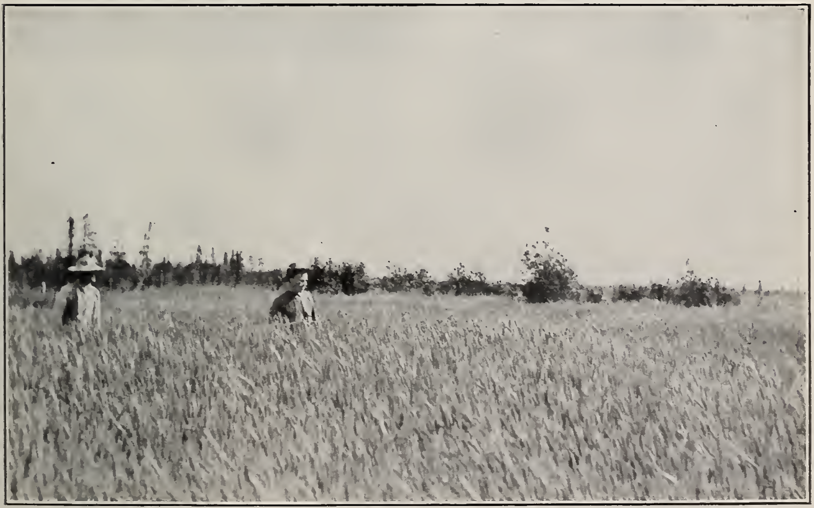
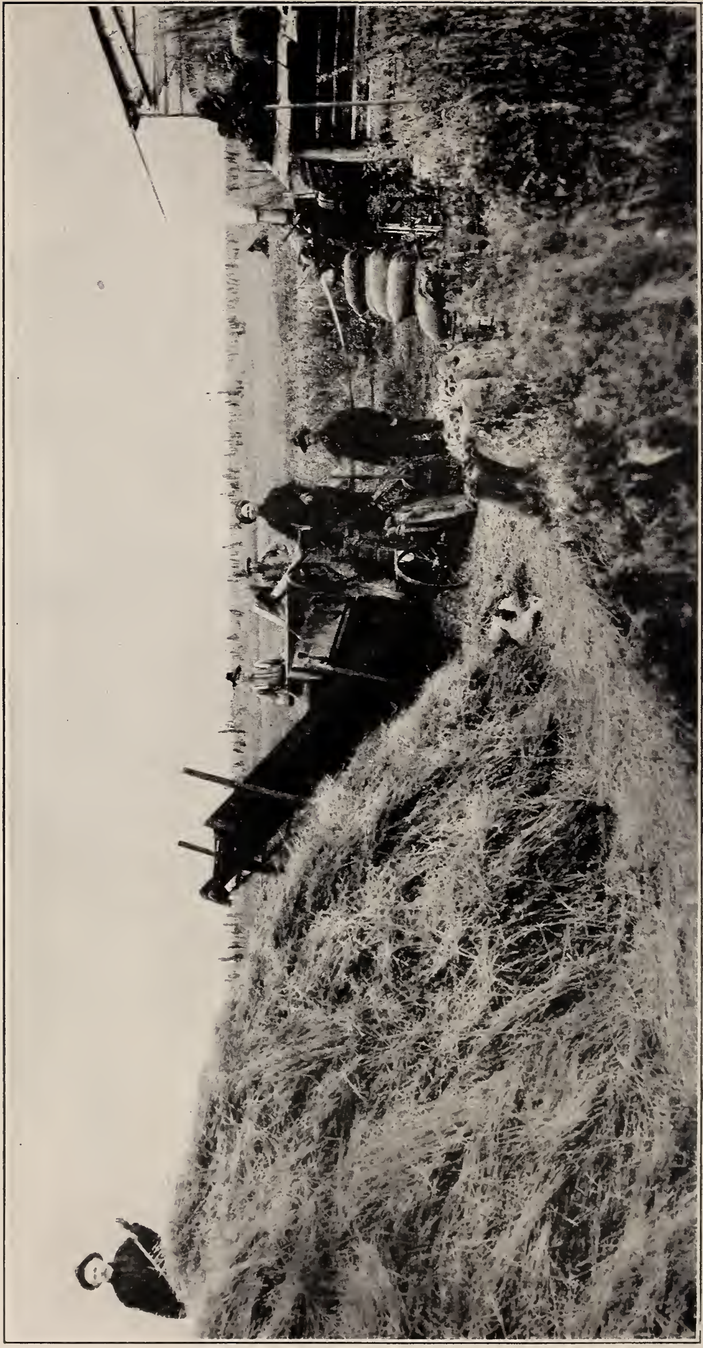


FIG. 2.—SIBERIAN WHEAT, AUGUST 8, 1919, H. H. BERRY'S RANCH.



THRASHING IN TANANA VALLEY.

HOMESTEADERS.

Ninety-eight homesteaders have located within the surveyed lands in the vicinity of Fairbanks, and it is estimated that 75 settlers live outside the surveyed lands. These are squatters on the land awaiting Government survey before filing claims. Some few have filed claims in the United States commissioner's office, the same as mining claims are filed. The land under cultivation among these scattered settlers varies from half an acre to 40 acres, depending upon the immediate needs of the settler, little or no market being available for his crops unless he is near some mining camp, or along one of the few trails of the interior.

SEED DISTRIBUTION AND COOPERATIVE WORK.

The distribution of seed among farmers and settlers was continued this year with grain and potatoes. The usual supply of garden and flower seed from the United States Department of Agriculture failed to arrive, and many applicants were informed through the papers and by letter in time for them to send to the States for seed. All applicants who were too late in sending in their requests to secure seed from the States were supplied with seed from the local market by the superintendent. Ninety-three requests for seed were received and complied with so far as the station supply would permit. Forty-six settlers were supplied with seed wheat, ranging from 4 to 100 pounds. Wheat was sold for seed in the amount of 658 pounds to 12 settlers, 972 pounds seed furnished to 11 settlers and returned after thrashing, and 81 pounds furnished free in 1 to 4 pound lots sent through the mail. Seventeen settlers were supplied with seed oats in amounts ranging from 1 to 10 pounds each, and the same number was supplied with seed barley in small amounts. Seed barley was sold in the amount of 175 pounds. Thirty-six settlers were supplied with pure varieties of seed potatoes in the amount of 1,392 pounds, of which 560 pounds was sold to 15 settlers, 800 pounds supplied in exchange for commercial potatoes for stock feed, and 32 pounds supplied free through the mail. Garden seed and Petrowski turnip seed were supplied to 42 settlers.

Reports coming from all over the interior of Alaska show progress among the farmers in grain growing. (Pl. I, fig. 1; Pls. IX, X, XI, and XII.) From the Tanana Valley farmers 38 reports have been received to date, showing a total area under cultivation of 999 acres, 77 of which was cleared this season. Owing to the isolated positions of many of the homesteads, it is difficult to get definite figures as to acreage or crop yields.

The growing of wheat among the 38 settlers reporting shows an increased acreage over last year. Seventy-nine acres with a yield of

1,519 bushels was reported, showing an average acre yield of 19.2 bushels. Sixty or more settlers were growing wheat. The largest amount grown by one settler was 266 bushels. Twelve reports show a total of 50 acres of oats grown with an average yield of 41.1 bushels per acre. The largest acreage for one settler was 12 acres which yielded 625 bushels. Fifteen acres of barley grown among 9 settlers shows an average yield of 12.6 bushels.

The acreage of grain hay reported is 586 with a yield of 612 tons of cured hay. The low yield per acre is due to the fact that grain hay has been grown upon the land continuously and the soil moisture and available plant food is becoming depleted.

From reports at hand and a conservative estimate of the amounts of wheat seeded in the spring, approximately 100 acres of wheat was grown in the Tanana Valley and produced approximately 1,920 bushels the past season. The experiment station thrashed for 24 farmers during the fall and early winter in exchange for work done by them. (Pl. XII.) This work was done to enable the farmers to continue in grain growing until a sufficient acreage has been grown to warrant their buying a custom thrashing machine. One other small thrashing machine is owned by a local farmer who does not care to move his machine about among the farms. Four self-binders are now owned in this vicinity.

The potato crop reported shows an acreage of 153, and a yield of 365 tons. It is estimated from all figures obtained that 523 tons of potatoes was produced on 220 acres in the Tanana Valley. (Pl. I, fig. 2; Pl. XIII, figs. 1 and 2.)

MARKET FOR FLOUR.

To further encourage the growing of wheat, all farmers were offered the use of the station flour mill to grind Graham flour at actual cost. To date 6,155 pounds of Graham flour has been milled. The erection of a small flouring mill would greatly stimulate wheat growing in the Tanana Valley. The local markets sold 186 tons soft-wheat flour and 200 tons hard-wheat flour during the year 1918. Wheat necessary to produce this amount of flour would be approximately 20,000 bushels, which would require approximately 1,350 acres annually grown to wheat. With the advent of a small flouring mill in this country the agricultural development would be rapid. The retail price of wheat is now $5.40 per bushel. This will be lowered 1 cent per pound when the Government railroad is completed. There will be a margin of 2 cents per pound on wheat until the production is equal to the consumption.

NEEDS OF THE STATION.

The more urgent needs for immediate consideration are: Two cottages of moderate size having some modern improvements in the way of bathroom and kitchen plumbing for the use of the superintendent and his assistant; a modern stock barn which will be large enough to accommodate 20 or more cattle and to serve as a storage for hay for them; a silo of 100 tons capacity, below ground; a small herd consisting of 10 or more Galloways, Holstein-Friesians, or Shorthorns; and some milk goats; funds for clearing 70 acres stump land for farming purposes.

REPORT OF WORK AT KODIAK STATION.

By W. T. White, *Assistant in Charge.*

CLIMATIC AND CROP CONDITIONS.

The season of 1919 was very unfavorable to crop production at the Kodiak Station. The drifted snow lay upon the fields until May 2. In former years it has been possible to begin the preparation of seed beds the last of April or the first of May. This year it was rainy throughout the month of May, rain having fallen on 20 days. On the days of no rainfall the soil did not dry enough to take a plowing outfit on the field without miring. June, on the other hand, was unusually dry, and as the soil during a protracted dry spell quickly dries out to the depth at which seeds are usually planted, all the seeds were slow in germinating. By early July, forage crops had become so stunted and dwarfed that it was doubtful whether or not they would make sufficient growth to be harvested. The following table has been prepared to show comparisons of the average precipitation and average maximum temperature for April, May, and June since 1908 with those for the same months of the year 1919.

Precipitation and temperature for April, May, and June.

Month.	Average precipitation since 1908.	Precipitation 1919.	Average maximum temperature since 1908.	Average maximum temperature 1919.
	Inches.	*Inches.*	° *F.*	° *F.*
April	5.6	4.35	40.6	43.4
May	4.79	7.57	48.9	44.8
June	5.0	2.40	54.9	60.1

The table on page 55 shows the unusual amount of moisture in May, 1919, and the marked lack of it in June; also that April was 2.08° above normal in temperature, and that May was 4.1° below and June 5.2° above normal. The unusually high temperature for June, together with the lack of rainfall, tended to make the season most unpromising.

CROP WORK.

Fourteen acres at Kodiak and 8 acres at Kalsin Bay were plowed by June 10 and seeded to forage crops by June 16. After the planting was done, dry weather set in and continued until July 6. Because of a torrential rain that occurred just as the plowing was finished, the fields on the second bench flats, at Kalsin Bay, where the volcanic ash lies from 10 to 16 inches deep, had to be given a heavy disking to loosen up the soil.

FERTILIZER EXPERIMENTS.

At Kalsin Bay six plats of 1 acre each were divided into 2 series of 3 acres each and fertilized as follows: One plat in each series, 10 tons stable manure; one plat, 10 tons stable manure and 125 pounds nitrate of soda; and one plat, no fertilizer. The soil was volcanic ash and the crops were oats and peas. The application of 10 tons of manure increased the yield of hay 11 per cent, while 10 tons of manure and 125 pounds of nitrate of soda increased the yield 15 per cent.

At Kodiak 5 acres were each seeded to oats and fertilized with 8 tons stable manure. One-half of this plat, or 2½ acres, received in addition 125 pounds nitrate of soda per acre. The yields of the two plats were identical, showing that the commercial fertilizer had been of no advantage in this case.

SILAGE.

The work of making silage was started on July 15, wild rye (*Elymus mollis*) and tall beach sedge (*Carex cryptocarpa*) being cut along the tide flats, loaded in the skiff, and towed to Kodiak, where they were loaded on wagons and hauled half a mile to the silo. Seventy-five loads of good silage were procured for the Kodiak silo and 90 loads for the Kalsin Bay silo. A second skiff is badly needed in connection with this work. The beach rye and sedge, which has a sweetish taste when the seeds turn brown, were put in the silo as they came from the beach, no attempt being made to separate them. It was observed that the cattle ate the sedge silage first if offered to them in separate lots; or they selected the sedge silage first if fed to them mixed and uncut. All the silage at Kodiak was run through the cutter, but at Kalsin Bay an accident to the cutter prevented the

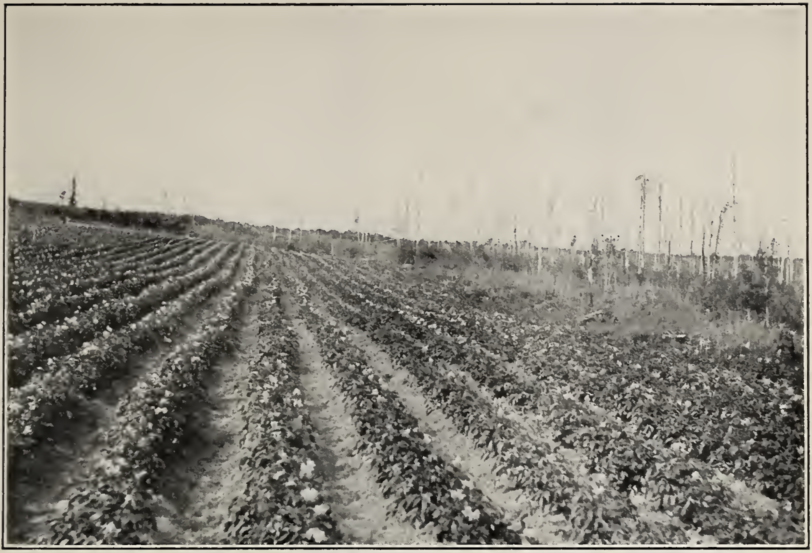


FIG. 1.—POTATO GROWING ON NEW LAND, F. ISAACSON'S RANCH NEAR FAIRBANKS.

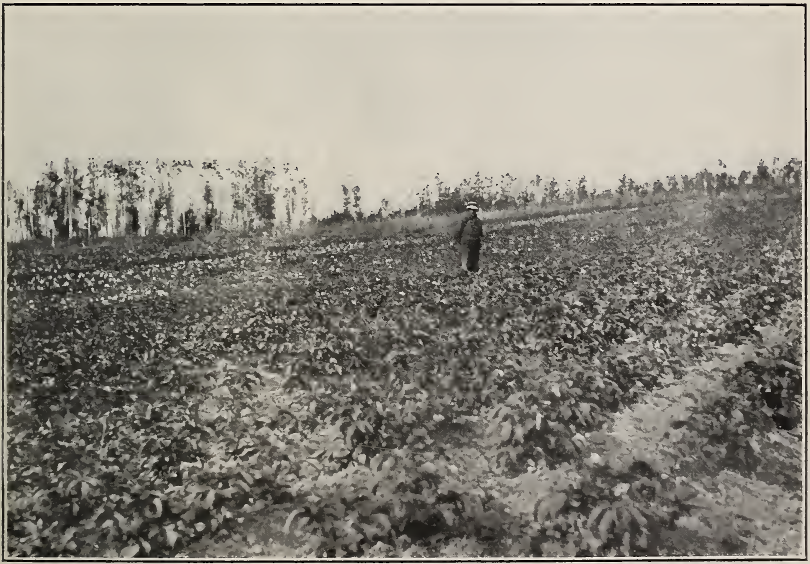


FIG. 2.—POTATO GROWING, F. BETCHART'S RANCH NEAR FAIRBANKS.

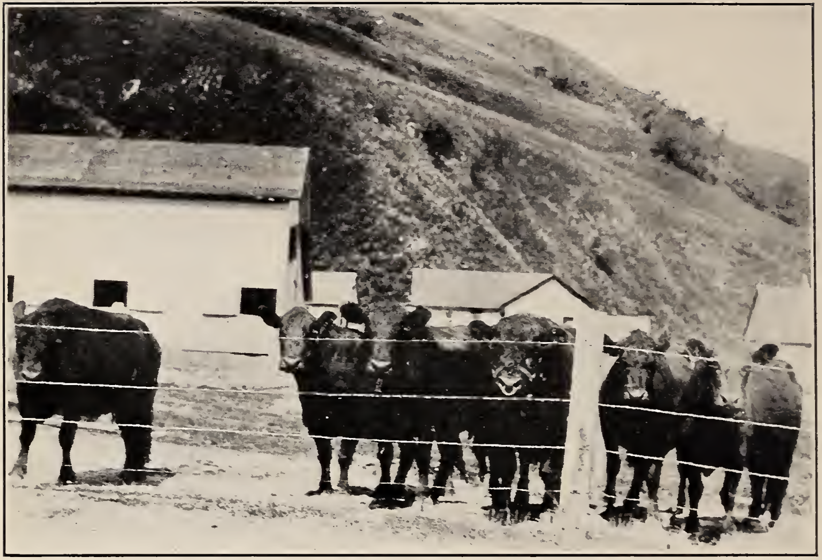


FIG. 1.—GALLOWAY CATTLE REACTING TO TUBERCULIN TEST, KALSIN BAY.

FIG. 2.—SUPERINTENDENT'S COTTAGE, KODIAK.

cutting of the last 15 loads, which were pitched in from a scaffold as the green forage came from the beach, care being taken to see that it was evenly distributed, well packed, and kept moist with running water which was supplied by means of a hose. The only difference noted between the cut and uncut silage was that the latter spoiled to twice the depth on top; that it took more space while filling the silo; that it was harder to get out of the silo; and that the cattle wasted greater quantities of it.

The cattle had been off succulent feed four weeks before the silos were opened. They had commenced to shrink and their hair was becoming rough. Two weeks after they had been fed full rations of hay and silage, they were as fat and smooth looking as during the summer.

FEED RATION.

Thirty pounds of silage and 10 to 20 pounds of hay, depending on the quality, are being fed per 1,000 pounds live weight per day, as a winter ration. The milking cows, bulls in service, and calves receive in addition from 1 to 5 pounds daily of grain composed of equal parts of ground oats and rolled barley, the amount depending on the individual.

HAYING.

Haying commenced at Kalsin Bay July 29 and was continued intermittently with silage work until September 6. At Kalsin Bay there is ample forage for hay for all the needs of the station, but the flats and parks that produce the most hay and are smoothest to run the mower over are about 2 miles back from the station buildings and reached only by temporary roads across the ash flats. These roads have to be relocated and rebuilt after every rain. The level parks close to the station buildings, which in past years have produced sufficient hay (*Calamagrostis scabra*) for the station live stock, have been cut and pastured so closely that they produce only a small quantity of hay at present. If the hay can be procured farther away without too great additional expense, it is planned to let the land close to the buildings rest for two or three years so that the grass may have a chance to reseed itself and form a permanent sod. The grass is slowly gaining a foothold over all the ash-covered areas, except in a few unprotected spots that are constantly exposed to the winds.

One hundred and ten tons of well-cured hay was put up between showers. Fifty tons of this hay was more or less fouled with old grass, it being necessary to cut several parks that had not been cut or burned the previous year. About 5 tons of hay that was rained on is being held in reserve for use in case the spring should be a late one with a resultant shortage of first-class forage.

TEST OF SUNFLOWERS FOR SILAGE.

Giant Russian sunflower seed was planted in various places about the station in well-prepared beds. On the south slopes the plants reached a height of 2 feet. The seed was planted June 2, and all the plants were up two weeks later and were hoed at intervals throughout the summer. It did not offer much promise as a forage plant this year, but will be tested again with the possibility that a more favorable season will produce a more satisfactory growth.

OTHER FORAGE CROPS.

Alfalfa, spurry, Petrowski turnips, buckwheat, and vetch were planted in 200-foot strips 6 feet wide on a southeast slope that had been well plowed. The land was said to have been manured during each of the two previous years at the rate of eight loads to the acre.

Alfalfa (Grimm), broadcasted June 2, came up June 14, producing an 80 per cent stand of spindling yellowish plants which attained a height of 8 inches. A plant having more than one stalk was exceptional. Two rows were also planted at the same time the plat was planted, and the latter was hoed several times during the summer to cultivate it and keep down the weeds. The plants in the rows showed a tendency to stool, each plant sending up several stalks which reached a height of 10 or 12 inches.

Spurry planted June 2 came up June 12, reached a height of 10 to 12 inches, and showed a strong tendency to vine, covering the ground in a mat. It was greatly relished by the calves, which were allowed on the field September 10.

Petrowski turnips sown June 2 came up June 14, but made slow growth. The largest roots did not exceed 2½ inches in diameter September 10.

Buckwheat (Japanese) seed planted June 2 came up June 12, grew to a height of 10 inches, produced a 75 per cent stand, flowered sparingly, and set no seed.

Vetch (*Vicia sativa*) seed sown June 2 came up June 20 and grew to a height of 5 inches, and produced a 5 per cent stand.

POTATOES.

Potatoes from local seed, largely Early Rose, were planted in two series of plats, three plats to a series. The size of each plat was 15 by 40 feet. Quartered potatoes were planted 4 inches deep in holes made by a spud stick. The rows were 3 feet apart with an 18-inch interval in the rows. Before it was plowed plat 1 of each series was given an application of 600 pounds per plat of cow manure. Plat 2 of each series was given an application of 600 pounds of cow manure before plowing and 15 pounds, or about 2 ounces per hill, of sodium nitrate, placed on the uphill side of each potato hill when the potatoes were 5 inches high, July 20. Plat 3 of each series was not treated. All the plats were kept hoed and well cultivated throughout the summer. Fifteen pounds of quartered potatoes were planted in each plat on June 6, and by June 29 a few plants were showing in all the beds. All the plats were in bloom when harvested September 28. The yields are shown in the following table:

Results of fertilizer test with potatoes grown from local seed.

Plat No.	Treatment per plat.	Yield per plat.		Average yield per plat.	Salable potatoes.
		Series 1.	Series 2.		
		Pounds.	*Pounds.*	*Pounds.*	*Per cent.*
1	Cow manure, 600 pounds, applied before plowing	27	25	26	66
2	Cow manure, 600 pounds, applied before plowing; sodium nitrate, 15 pounds, applied when the plants were 5 inches high	32	33	32.5	5
3	No fertilizer	22	25	23.5	7

Plat 2 of each series had a much greater vine growth and yielded twice the number of potatoes produced on either plat 1 or plat 3. The experiment indicates that an application of sodium nitrate might be profitable in normal seasons, as it causes the potatoes to set well and produce a vigorous vine growth.

It is the practice of native gardeners and potato growers to fertilize their potato beds with kelp as it is gathered from the seashore in the spring. Ditches 1 foot deep and 2 feet wide are made where it is intended to place the potato rows, and kelp 4 to 6 inches deep is placed in the ditches and covered with soil. The potatoes are then planted 8 to 10 inches apart, the pieces being dropped in holes made with a potato spud. In some cases the planter uses only the peelings and covers them by packing the soil with his foot as he walks along. Marked results are obtained from the use of kelp which has been incorporated in the soil in this manner. Kelp improves the humus content and water-holding capacity of the soil, and is of value during the short dry periods, when the soil dries very quickly.

VEGETABLES.

The vegetable garden was treated with an application of cow manure at the rate of 15 tons to the acre before it was plowed, and a top-dressing of nitrate of soda at the rate of 200 pounds to the acre was given five days after planting. Radishes and lettuce produced abundantly. Peas and beans grew slowly and set fruit sparingly. Cabbage plants failed to head. Beets grew slowly, reached only a small size, and were woody. Onions from sets grew slowly and became no larger than an inch in diameter.

BERRIES.

Two plats 20 by 40 feet of gooseberry and red currant bushes were cultivated by turning under the grass sod which had been allowed to grow about them. They were then given a 4-inch mulch of cow manure which was later incorporated in the topsoil by turning under with a fork. On July 10 sodium nitrate at the rate of one-half pound per bush was placed about every other bush in the rows, care being taken to place none of the nitrate closer than 6 inches to the bush. The results were marked. Two weeks later the plats presented a spotted green and yellow appearance from a distance. The treated plats put out a larger number of shoots, and the leaves were greener and larger. It could not be seen that any more flowers were produced, but a decided increase was noted in the amount of fruit set. On August 30 many of the branches of the treated plants were borne to the ground by the weight of the fruit. The fruit was all of small size, due possibly to the unfavorable season.

CATTLE.

The work with cattle is being carried on as outlined in former reports. Four herds of cattle are kept, one composed of purebred Galloways; a second of purebred Holstein-Friesians; a third of crossbred stock obtained by making reciprocal crosses between the Galloway and Holstein-Friesian herds; and a fourth, composed of tuberculous animals kept in the quarantine herd.

At present the Galloway herd consists of 11 breeding cows, 2 two-year-old heifers, 2 yearling heifers, 4 heifer calves, 3 yearling steer calves, and the herd bull purchased at Carrollton, Mo., in May, 1919. One three-year-old bull was shipped to the Matanuska Experiment Station in May, 1919.

The Holstein-Friesian herd is composed of 4 breeding cows, 1 two-year-old heifer, 2 bull calves, 1 three-year-old bull, and 1 herd bull.

The crossbred herd consists of 3 two-year-old heifers and 3 bull calves.

The tuberculous herd is composed of 7 breeding cows and 1 herd bull. (Pl. XIV, fig. 1.) A marked degree of success is being had with a modified form of the Bang method which is being followed in the hope of producing healthy calves from this herd.

The cattle were turned on pasture at Kalsin Bay May 15 and at Kodiak May 20. A considerable quantity of beach grass is available for pasture at Kalsin Bay, while at Kodiak the only available pasture is bluetop. The beach grass seems to start from 10 days to 2 weeks ahead of the bluetop. Beach grass makes an excellent spring pasture as it quickly shoots up long succulent stocks and leaves. Cattle and sheep pick up and fatten quickly upon it. Some danger is likely to result from pasturing beach flats unless the grass is cut or burned.

Too much of the old grass when eaten by the cattle will cause impaction.[1]

SHEEP.

The flock of station sheep consists at the present time of 23 breeding ewes, 6 lamb ewes, 8 wethers, and 1 Lincoln ram, purchased in Bliss, Idaho, May, 1919. The sheep were wintered at Kalsin Bay where they foraged for themselves until March 1, 1919, when they were given a light ration of hay and silage night and morning. The silage was taken from the bottom of the silo. Of the 15 lambs dropped, 10 were saved. The flock was sheared June 1 and immediately transferred to Near Island, near the Kodiak Station. With the exception of the ewes that had suckling lambs, they were all fat by August 1, and were still so when taken off the island and transferred back to Kalsin Bay December 1. The sheep would be kept on the island the year round were it not for the possibility of deep snows and a continued spell of bad weather which might prevent their being taken off the island.

At Kalsin Bay the sheep range on the hillsides during all but the stormiest days, and at night they are given all the hay they care to eat while under shelter. To date they have eaten very little hay, however.

TUBERCULOSIS.

The work of testing the station herds for tuberculosis, as well as the cooperative work of testing the cattle of the Territory of Alaska, is being done by B. C. Parker, veterinarian and assistant at the Kodiak Station. The test for tuberculosis was started on the cattle at Kalsin Bay July 14. No reacters were found. The test on the Kodiak cattle was started July 22. No positive reacters were found, but two aged cows which gave a sufficient rise in temperature to be classed as suspicious were transferred to the quarantine herd at Kalsin Bay.

GENERAL IMPROVEMENTS.

At Kodiak the cottage occupied by an assistant was repapered and repainted. The superintendent's cottage was finished both on the interior and the exterior, plumbing installed, and the chimney rebuilt in such a manner as to prevent leakage around it. (Pl. XIV, fig. 2.) Two stalls were rebuilt in the horse barn, the dirt floor of the machine shed was raised above the surrounding surface, and a wide ditch dug to lead off the surface water. The dairy barn roof was patched where it had been damaged by winds the previous winter, several broken windows were repaired, and the litter carrier track was installed. An accumulation of 25 loads of trash, rotted stumps, spoiled silage, and 55 loads of manure was removed from the dairy barnyard. Seventy-five rods of corral fence was repaired and seven gates were made and hung. Eight miles of fence was repaired, 220 feet of water pipe was dug up, and sections damaged by freezing were replaced with new pipe. The ditches were then dug a foot deeper so as to place the pipe below the frost line. Three hundred feet of sewer ditch was dug and a 4-inch sewer laid. Two cement septic tanks were constructed, 8 by 4 by 3 feet, one taking the sewage from each of the two cottages. An open drain 200 feet long was dug and filled with alternate layers of stones and poles and covered with soil to drain the barnyard. The Kodiak Station site once had ample drainage, but since the volcanic ash fall in 1912, the terrain has been changed to the extent that it is now necessary to provide drainage.

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[1] Alaska Stas. Rpt. 1916, p. 59.

The lathing in the farm foreman's cottage at Kalsin Bay was finished and the entire cottage plastered; the roof and sides were painted, the inside woodwork and the porch finished, and a concrete chimney was built.

Numerous and extensive repairs were made to the roofs of the cow shed, horse barn, and machine shed. These barns and outbuildings are covered with felt roofing paper. However, owing to the high winds and the excessive amount of rainfall, it is almost impossible to keep the roofs in repair.

Excavation for a 34 by 70 foot dairy barn was started July 28. A cement foundation was constructed, and the cement floor was laid except the mangers and that part of the stalls in which the ironwork is embedded. This had to be left unfinished because of failure to obtain the iron supporting columns that are to be placed in the green cement walls of the mangers. The frame of the building was erected and the siding painted as it was put on. The work was delayed 30 days because of the failure of a shipment of roofing material to arrive at the proper time. On the arrival of the roofing it was put on, and window frames and doors were made and placed. The building is 90 per cent complete and will be finished as soon as the weather warms up. The iron supporting columns can be obtained when funds are made available to carry on the work.

Two hundred and ninety feet of water pipe was dug up and cleaned of ash, two sections which had been split by freezing were replaced with new sections, the ditch was dug a foot deeper, and the pipe replaced and covered. Two hundred and seventy-five feet of new ditch was dug and pipe laid to the new dairy barn. Ninety feet of riprapping 6 feet high was constructed to prevent the torrential rains from causing the little mountain stream close to the dairy barn to flood the barnyard.

Three miles of fence was rebuilt, the barnyard fences extensively repaired, and numerous gates made and hung.

NEEDS OF THE STATION.

Additional land should be cleared, broken, and sown to tame grass in order to avoid the heavy expense of bringing hay from Kalsin Bay and the neighboring beaches. A tractor and a heavy plow are needed for the purpose of plowing the land deep enough to turn up some of the soil lying beneath the ash.

A manure pit should be constructed with a roof over it to conserve the much needed manure and keep the barnyard sanitary.

A sanitary shed to house 20 calves should be built to conform to the sanitary requirements established in the eradication of tuberculosis from the herd.

A blacksmith shop is very much needed, as all kinds of repairing must be done at the station. Blacksmith work should not be done in the implement shed, as is now the case. A shop to fill the need should be roomy, well lighted, and warm, as the most economical time to do repairing is during cold or inclement weather.

A milk house, the 12 by 24 foot foundation of which has already been laid, should be completed. This building should be finished as soon as possible, so that the milk of an occasional tuberculous animal found in the herd can be pasteurized before it is fed to the calves.

As the office work is continually increasing, a small office should be erected in order that permanent shelves and closets may be installed for the keeping of records and accounts. The 12 by 18 foot foundation for this building has already been laid. The energy of the station is directed more and more each year to experimental work, instead of pioneering work, which consumed the greater part of the station's energy in the past. At present, the office work is carried on in a small room in the superintendent's cottage, which is unsatisfactory both as to location and size.

The station library is at present composed entirely of some 400 bulletins and circulars, the greater part of which deal with subjects foreign to the work in hand. A small number of reference books pertinent to the different phases of the station work should be added to the library. Under the present mail situation franked bulletins seldom reach proper destination. Letters are often received notifying the station that bulletins requested have been sent, but the bulletins fail to arrive.

A second skiff costing probably $500 should be added to the boat equipment so that the silage may be more economically obtained from the neighboring beaches. A second skiff would make it possible for the launch to take an empty to the place where the cutting is being done when going after a loaded skiff. It would also permit a continuous operation of the cutting crew as well as the crew at the silo. When it is known that from 20 to 25 trips must be made to points on the beach 8 to 15 miles away in order that one silo may be filled, the advantage of having a second skiff will at once be realized. It is hoped that enough ground may be broken and planted to tame grass to supply the Kodiak Station with hay for the stock, but it would be too much to expect to try to raise tame grass for silage for some time. It is doubtful if a sufficient amount of hay can be made during the summers of excessive rainfall. To tide over seasons of this kind an extra amount of silage should be provided, as silage can be put up at any time regardless of weather conditions, with the exception of those occasional periods during which heavy gales occur.

The two mowing machines at this station are excessively worn because of the ash, and should be replaced. When the writer took charge in April, all the machinery was in poor condition. The action of the sea air upon metal, the decay of wooden articles due to the rain, and the corrosive and abrasive action of the ash had almost destroyed the station equipment. The destructive effect of the ash is probably lessening each year.

All the buildings and all the station machinery should be painted the coming year.

At Kalsin Bay the cow shed should be dismantled and moved elsewhere because the ash has so changed the terrain that the present place receives the drainage from a considerable area of higher ground. As the building is no longer needed for a cow shed, the new dairy barn being nearly completed, it should be rebuilt as a sheep shed.

The hay shed should be moved away from the cow shed and placed near the new dairy barn.

The smaller silo should be moved so as to be more easily accessible to the new dairy barn. The older 20-foot silo, which has been standing for many years, should be dismantled, as it has rotted beyond repair.

It is absolutely necessary that some kind of a small power boat be obtained and placed at the bay so that, in case of serious injury or sickness, either the word or the men can be brought to Kodiak. Medicine and assistance are also needed at times for the live stock. Since Kalsin Bay lacks anchorage where a boat can be safely moored during the frequently occurring northeast blows, the boat should be of such size and structure that it can be beached when not in use. At the same time it should have sufficient power and be sufficiently seaworthy to make the trip in any but the worst weather. The station launch *Red Wing* makes a trip to Kalsin Bay every 10 or 14 days, but these trips cost at least $15, and when storms or engine troubles occur the expense is often doubled.

The only other alternative is that of installing a small radio telegraph or telephone outfit between the two stations. It is impossible to put in a telephone line along the beach because of the great irregularity of the shore line; or over the mountains because of the expense involved in installing and maintaining such a line. It can be conservatively estimated that a wireless telephone in successful operation would save $800 in the cost of boat operation and equipment the first year, and $300 to $400 a year thereafter, exclusive of the cost of the outfit. It would also effect a material saving in the coordination of the work between the two stations.

REPORT OF WORK AT MATANUSKA STATION.

By F. E. Rader, *Assistant in Charge.*

This station is still in a pioneer stage of development, and naturally much of its energy must be used in clearing land and providing proper buildings for the housing of employees, domestic animals, and machinery and tools. Owing to a lack of funds, not much of this work was accomplished during the summer of 1918, but considerable progress can be reported for the fiscal year 1919.

Ten and one-half acres of land was cleared near the station buildings in 1919, and 12½ acres had been cleared in 1917, making a total of 23 acres of cleared land near the buildings. Eight and six-tenths acres of this was cleared by contract for $100 per acre and the remainder at odd times by day labor. With the exception of about 4 acres of rather steep hillside, all of the burned land on this part of the reservation has been cleared. Clearing green timbered land is a rather expensive process. The cost involved in this work can be somewhat lessened if the timber is slashed, several running fires are started, and the land is cleared a couple of years later when the stumps have rotted; but this method requires considerable time. Since the reservation is all timbered and will afford very little forage for cattle and horses, it is necessary to clear land for pastures as well as for farming purposes. The immediate need of the station is a larger acreage of cleared land, and as long as burned land remains to be cleared, it is not thought advisable to spend much time and money in clearing green timbered land. About 50 acres of burned land was found on another portion of the reservation, the south end of section 14, about three-fourths of a mile from the buildings. Much of this land is fairly level and it was decided to begin clearing the best of it. The timber was burned in 1915. Later a prolific growth of fireweed took possession of the ground. Occasionally when the conditions are just right the dead weeds, remaining spruce tops, small limbs, and trash make fine fuel for a running fire which consumes all the small stuff and often burns in half the trunks of trees which lie across each other. The process of handling the charred timber is dirty work, but that of clearing is much simplified and cheapened by the burning. Later in the season when fireweed has again grown up, the work of clearing is somewhat harder, but even at its worst the work is easier than where no running fire had been started. The combination of dry weather and a stiff breeze on May 2 made favorable conditions for a fire, and about 30 acres of this land was burned over. Nearly 3 acres was cleared by day labor during April and the early part of May by means of a partial running fire, at a cost of $60 per acre; 15.48 acres was cleared by contract for $50 per acre, and 2.9 acres for $75. All together 31.5 acres was added to the cleared land during the summer, making a total of 44 acres cleared since the work here was started. This ground has been all fall plowed, and, with the exception of the couple of acres around the buildings, will be available for crops next season.

During the spring and early summer months the weather was such that it was thought conditions would be favorable for getting a ground fire. Although there was very little precipitation, the weather did not get hot enough to dry out the moss in the timber. Not a single fire could be started. A few ground fires were started in 1918, but with these exceptions, no good ground burns have been secured since 1915.

The highway which runs for over half a mile through the reservation was fenced on both sides for the greater part of the distance with a three-strand barbed wire fence. Late in the fall, posts were set around a 10-acre piece of timberland which was to be fenced for a pasture. This piece of land will afford some forage not only where the timber has been cut but along old roadways and trails.

BUILDINGS.

During the winter considerable work was done toward finishing the interior of the superintendent's residence. During the summer a concrete walled cesspool was built about 250 feet from the house, and a 4-inch sewer was laid to connect the two. The sewer was buried at a depth of from 7 to 7½ feet to make it safe from freezing.

Work was started on a combined cattle and general-purpose barn built in the form of the letter T. The cattle barn will be a one-story frame structure 34 by 72 feet, built lengthwise north and south, so as to get the sun from both sides, and from the south through the end of the building during the middle of the winter. It will contain 24 cattle stanchions, 2 calf pens, and 2 bull pens. The interior appointments will conform to modern standards of construction, pipe stalls and pens, concrete floor and feed troughs, overhead litter and feed carriers, ventilating system, etc. The general-purpose barn will be a two-story building. The horses will be stabled in the west end. The remainder of the building will be used for feed rooms and the storage of hay and grain. It is planned to have the silo and the root cellar on the north side of the barn. The building site is protected on the north and east sides by a bank about 20 feet high and by timber. One corner of the general-purpose barn was built into the bank, which necessitates considerable excavation. The good topsoil was used to fill in low places about the buildings and yards. The sand, gravel, and poor soil were used partly to fill a small pothole in one corner of the barnyard where it is proposed to have the manure pit and liquid-manure cistern. It is planned to build open sheds into the bank along the east side of the yard and thus have a yard inclosed on three sides. The north and east walls of the general-purpose barn are of solid concrete 9 inches thick to the height of the first story, but the remainder of the barn will be of frame construction. The concrete work for the foundation of the whole barn has been completed. Nearly all of the necessary lumber is on hand and the erection of the superstructure will begin in the spring as soon as the snow leaves.

A combined poultry and hog house, 18 by 50 feet, was built during the summer. This is a one-story log structure put up on a concrete foundation. This building, when completed, will have two poultry pens at one end, three or four hog pens at the other end, and a room 8 by 18 feet, for cooking feed, in the middle. Under one end of the building a small basement was excavated, where a stove has been installed to heat the building when weather conditions demand it.

The 27 by 33 foot concrete foundation for a foreman's cottage was about half completed.

The principal additions to the station equipment this year were a thrashing machine, which has just been received, and a gasoline engine. The thrashing machine has a 24-inch cylinder and a 33-inch separator. The gasoline engine is a 12-horsepower marine engine formerly used in a launch at the Kodiak Station. It has been thoroughly overhauled and converted to stationary use for this station. Both are valuable additions to the equipment.

For the convenience of the farmers owning cows, a purebred Galloway bull was transferred in June from the Kodiak Station. This is only a temporary arrangement. It is planned to introduce here next year a milking strain of Shorthorns.

WEATHER CONDITIONS.

The winter of 1918–19 was mild. The lowest temperature, 34° below zero on January 29 and 30, was as cold as the minimum of the previous winter, but no cold spells continued so long as those of the winter of 1917–18. Rain fell on November 20, 21, 22, and 23. On December 22, 0.38 of an inch fell, and on December 25, 0.37 of an inch more. This melted all the snow which had fallen up to that time and the cleared ground in the vicinity of the station resembled a block of ice. A rain and snow occurred December 31. At the end of January the ground was covered with 6 inches of snow. During February only a trace of snow fell and in March but 1 inch. By the end of the month all the snow had disappeared. Not a trace of precipitation was noticed during April, a fact which would seem to indicate an early spring, but, as a matter of fact, the ground was very slow to thaw out and dry off even where fall plowed. Seeding could be started only a very few days earlier than in 1918. Frost was found May 8 at a depth of only 8 inches on entirely bare fall-plowed ground. With only one exception the rains during May and June were light, hardly enough to wet through the dry surface of the ground. Spring-plowed ground, unless well packed, did not get wet down as deep as it had been plowed until after the middle of July. On this soil alone the grain crops suffered much for want of moisture where the ground had been fall or spring plowed and the seed bed well compacted. Plenty of rain fell after July 15. August 8 to 18 was a period of fine weather, but, unfortunately, none of the grain was mature enough to harvest.

A light frost on September 17 touched the tips of buckwheat but injured nothing else. Four degrees of frost on September 25 partly killed potato vines. The first killing frosts occurred on September 30 and October 1 with a minimum temperature of 24° F. The last of the potato crop was dug on the afternoon of October 4, but the turnips and rutabagas were still in the ground. Freezing weather did not seriously interfere with plowing until October 18, about the time such weather is expected in this region. It is sometimes possible to plow as late as November 10.

The frost-free period was 132 days as compared with 141 for each of the two previous seasons. The total snowfall for the winter was 27 inches; in 1917–18 it was 42½ inches. The total precipitation for the year from November 1, 1918, to October 31, 1919, was 11.93 inches. For the previous year it was 13.4 inches.

CROPS.

Fifteen acres of station ground and 15 acres of rented land was seeded to various crops this year. Six acres of the station land was newly broken this spring. Nearly all of the rented land had to be spring plowed. Ten acres of the rented land had been cropped continuously for four years without the application of fertilizer of any kind. In 1918 it produced 1½ tons of oat hay per acre. This year the soil was well compacted after plowing and the seed was put in with a drill, but very poor results were obtained. This may have been due to the dry weather in the early part of the summer, but the principal cause seems to have been a lack of available plant food.

The soil is a friable loam, and so far as physical character is concerned looks as though it ought to give good returns. The results in this case seem to bear out the observation made at several other places in the Territory, namely, that while Alaska soils may be inherently good, they do not have a very large supply of available plant food.

The first seeding was done April 23 when beardless barley was planted on about 2½ acres of rather steep hillside land. Three acres of newly cleared ground on section 14 was seeded to oats for hay on May 24. The soil was loose and the weather dry, with the result that only about half of the seed germinated. The crop was cut with the binder September 14. About 1½ acres of newly cleared land near the station buildings was likewise seeded to oats for hay on June 6. This seed was put in with the drill and germinated well. The crop was cut after the first hard freeze in October and cured on pole racks. A good portion of the crop was ripe and made a fine quality of hay.

WINTER RYE.

August 13, 1918, about one-fifteenth of an acre of each of the following varieties of winter rye was seeded on new ground: No. 193 (G. I. No. 281), North Dakota (G. I. No. 959), Monster No. 200, Brandon No. 266, Hogot No. 311 (G. I. No. 63). Brandon No. 266 did not germinate well, but all of the varieties made a good fall growth. With the exception of the spots where the winter rains formed pools on the frozen ground, all of the varieties came through the winter in perfect condition, and seemed to be equally hardy. They began heading June 1 and were in bloom July 1. In spite of the dry weather they matured very slowly and did not ripen until August 12, on which date all of the varieties were harvested. Two of the varieties, Brandon and Hogot, grew to an average height of 6½ feet; the others averaged about 5½. None of the grain has been thrashed at this writing so it is not known what the yield is, but judging from general appearances Brandon No. 266 and Hogot No. 311 are the best, and No. 193 the poorest. None of these varieties was seeded this fall. They headed so early that it was thought they would surely ripen in time to produce new seed for sowing, and no steps were taken to get a supply from the Rampart Station where the above varieties were grown. A plat of Giant French winter rye was seeded August 14. The seed was old and seemed to have lost its vitality. The stand is very thin.

OATS.

On April 29, two acres was seeded to Finnish Black oats with a drill on fall-plowed ground, part of which was new, the other part having grown one crop of oats. It began heading July 3. Part of the field was cut and fed green to the stock. The oats on the old ground was ripe and harvested August 14. That on the new ground was not ripe until September 1 when it was harvested. The estimated yield is 30 bushels per acre. Three-fourths of an acre, seeded with the drill May 15, was ripe and harvested September 15.

On May 9, 1½ acres of Canadian White oats was seeded with a drill on rented land. It began heading July 20, when only a few inches high, and was harvested September 15. A good crop of this variety volunteered on the plat where it was grown last year. It was harvested September 1 and saved for seed. This variety is not quite as early as Finnish Black, does not grow as tall, stands up better, and produces plumper grain.

A small plat of Kherson oats (Minnesota seed) was seeded May 16 on good new soil. It began heading July 11, ripened September 1, and was harvested on September 5. It grew to a height of 30 inches, has a small fine straw, and rather light grain. It has no special characteristics to recommend it for this region.

A few rows of Swedish Postia oats, seeded by hand May 15, began heading July 11 and grew to a height of 36 inches. The few heads which ripened were saved for seed for another trial.

A few rows of Wisconsin Pedigree No. 1 were seeded by hand May 21. By July 15 they were heading, but only a few early heads ripened, these being saved for seed for further trial.

Wisconsin Pedigree No. 7, seeded by hand May 21, began heading July 15 and was ripe and harvested September 18. It grew to a height of 36 inches. It is a nice appearing oat but slow to ripen. It will be given another trial.

BARLEY.

Beardless barley (S. P. I. No. 19852), seeded on 2.6 acres of new spring-plowed ground on May 17, began heading July 17 and was ripe and harvested September 2. It grew to a height of 36 inches, stood up well, and made a very fair crop, producing about 30 bushels per acre.

On May 12, hull-less barley (S. P. I. No. 19851) was seeded on 2½ acres of spring-plowed ground, part of the field having been in barley the previous year, and part in potatoes and turnips. It was ripe and harvested September 15. The barley grew to a good height for harvesting and made a very fair crop, yielding about 20 bushels per acre.

WHEAT.

Siberian No. 1 was seeded May 10 on 2½ acres of the rented land. It began heading July 11 when a foot high and was ripe and harvested September 1. This is a splendid variety when grown on good soil. The kernels are small, but the wheat ripens early compared with most other varieties.

Romanow, seeded May 10 on three-fourths acre of the field above mentioned, began heading July 15 and was ripe and harvested September 15. It grew taller than Siberian No. 1, but did not make more than half a crop. The same variety was seeded May 10 on 1¼ acres of new ground, fall plowed, and began heading July 24. Because of the varying character of the soil the crop matured unevenly. Some was ripe September 5, but the major part ripened on September 15, when it was harvested. The estimated yield was 20 bushels per acre. In 1917 this variety was reported not well adapted to this region, yet it has done exceedingly well the past two seasons. The kernels seem to be larger and plumper than the original seed, which came from the Fairbanks Station. Fully 20 per cent of last year's crop would not pass through the wheat screen.

Marquis was seeded May 16, partly on new ground and partly on the same ground used for this variety last year. It began heading on the old ground July 12. Since this variety matures very slowly it is not well adapted to the Matanuska region, though it does not shatter so easily as the above-named varieties. The wheat on the old ground ripened September 25, but that on the new ground failed to ripen.

BUCKWHEAT.

One-half acre was seeded May 19 on rented ground. Its blossoms first appeared July 5 and continued to appear until the first light frost September 17. A fair crop was harvested on September 18, the yield being 12 bushels per acre.

SUNFLOWERS.

In some of the Northern States the Mammoth Russian sunflower is used for silage. To try it as such here two rows, each 170 feet long, were planted in the garden May 17. When killed by frost the largest stalks had reached a height of 6 feet and half a dozen heads had just started to form. A neighbor had better success than this in 1915, but he did not ripen any seed. Another trial will be made at the station next year.

GRASSES.

In order to test the adaptability of the more common hay and pasture grasses to local conditions, a small plat of each of the following kinds was seeded broadcast May 7 and covered with a hand rake: Smooth or awnless brome grass, orchard grass, redtop, Italian rye grass, English rye grass, timothy, Kentucky bluegrass, crested dog's tail, and meadow fescue. Doubtless all these grasses would do best on moist, level land, but since it is the rough, hilly land that will be used for permanent pastures, they were seeded for testing on a hillside having southern exposure. The ground had been fall plowed and was harrowed several times before being seeded. Because of the dry weather much of the seed did not germinate until the rains became frequent during the latter part of July. However, all of the grasses made as good a start as could be expected. Several kinds sent up seed stalks but ripened no seed. Since it would hardly pay to seed any of these grasses for the sake of a single year s crop, a test of prime importance will be made to see how successfully they survive the winter. It is known that timothy will live through the winter, but so far it has proved unsatisfactory everywhere in Alaska for either hay or pasture. The experience of a neighboring farmer has shown that brome grass will survive even on exposed hilltops, but its value as a grass is yet to be determined. This field seeded in 1917 made a fine pasture in 1918, but in 1919 the grass did not make much growth, although the plants all seemed to be alive. Kentucky bluegrass will live through the winter, but it has yet to be tested as a pasture grass.

LEGUMES.

Small plats of the following clovers and alfalfas were seeded May 17 besides the grass plats above noted: White clover, common red clover, crimson clover, common alfalfa, Turkestan alfalfa, and Grimm alfalfa. The white clover made a nice start and will live through the winters. The red and crimson clovers and the first two named alfalfas did not come up well on account of the dry weather, and when the rains came growth was interfered with in spots by a volunteer crop of Canadian white oats. It was thought desirable to keep the oats for seed, and enough of each kind of clover and alfalfa was saved to test their hardiness. The Grimm was seeded in rows a foot apart and the soil well packed over the rows. The seed germinated promptly and a fine stand was secured. The plat was hoed several times during the summer. By August 15 some blossoms appeared but no seed ripened. At the end of the season the alfalfa was 14 inches high. The plants were light green in color, instead of normal dark green, which gave the alfalfa the appearance of lacking in vigor. The same condition was noted in tests of alfalfa made by several of the farmers. It is probably due to the lack of inoculation, but that has not yet been proved. An examination of a neighbor's field this summer showed nodules in considerable numbers from natural inoculation, but the alfalfa did not have any better color than that grown at the stationr It will require several years of experimentation to determine whethe. or not this valuable plant can be successfully grown here.

Three-fourths acre of Canada field peas was seeded with the drill May 14. This was Alaska-grown seed and made a fair crop, though not so good as in 1918. The vines were cut October 8 and hung on pole racks to cure. Peas have the advantage over any other annual legume in that the seed can be grown here.

POTATOES.

One and one-tenth acres of potatoes was planted on ground that had previously grown two crops of grain. The ground, which has a slight general slope toward the south, with the exception of one corner which slopes a little toward the north, was fall plowed, disked several times this spring, and marked off in rows 3¼ feet apart. The seed pieces were dropped at intervals of about 15 inches and covered with a hoe. All of the seed was given formaldehyde treatment for scab and then put in a warm place to sprout. The crop was cultivated three times with a one-horse cultivator and hoed twice. Very little disease developed this year, only one or two varieties being much affected with Rhizoctonia. The early varieties were large enough to use by July 27. The total yield from the 1.1 acres was 24,000 pounds, or almost 11 tons per acre. The following table gives the results of two years' trial of the 40 varieties:

Comparison of yields of 40 varieties of potatoes in 1918 and 1919.

Variety.	1918					1919				
	Color.	Date planted.	Date in bloom.	Calculated yield per acre.	Marketable potatoes.	Date planted.	Date in bloom.	Calculated yield per acre.	Marketable potatoes.	Quality.
				Bu.	*P. ct.*			*Bu.*	*P. ct.*	
Rusty Coat	White.	May 24	July 28	378	88	May 17	July 25	338	91	Good.
American Wonder	...do..	...do....	July 30	261	97	...do....	July 30	343	87	Excellent.
Irish Cobbler	...do..	...do....	July 24	298	95	...do....	July 11	343	92	Do.
Rural New Yorker	...do..	...do....	July 20	195	88	May 19	July 20	364	92½	Do.
Early John	...do..	...do....	...do....	292	93	...do....	...do....	360	93	Do.
Early Albino	...do..	...do....	July 24	246	94	...do....	...do....	367	92	Good.
Early Sunrise	Pink..	...do....	...do....	261	88	...do....	July 28	453	92½	Fair.
Early Puritan	White.	...do....	...do....	241	91	...do....	July 25	310	97½	Do.
White Prizetaker	...do..	...do....	July 30	271	89	May 20	July 29	387	89	Poor.
Burpee's Extra Early.	...do..	...do....	July 24	258	90	...do....	July 25	351	92½	Good.
Spaulding No. 4	Pink..	...do....	July 30	303	90	...do....	July 29	491	93½	Do.
Beauty of Hebron	...do..	...do....	July 24	261	96	...do....	July 25	459	86	Poor.
First Early	White.	...do....	July 20	211	87	...do....	...do....	317	87	Good.
Clyde	...do..	...do....	July 24	287	97	...do....	...do....	472	95½	Poor.
Pure Early Rose	Red...	...do....	July 30	188	89	...do....	July 31	387	93½	Good.
White Bliss	White.	...do....	July 24	299	76	...do....	July 11	420	95	Excellent.
Norcross	...do..	...do....	...do....	266	97	...do....	July 25	446	94	Fair.
Green Mountain	...do..	...do....	July 20	316	95	...do....	July 11	367	95½	Excellent.
Gold Coin	...do..	...do....	July 24	285	93	...do....	July 20	299	94	Good.
Uncle Sam	...do..	...do....	...do....	395	91	...do....	July 25	411	87	Do.
Green Mountain Seedling.	...do..	...do....	...do....	255	99	...do....	July 11	304	90	Do.
Admiral Dewey	...do..	...do....	...do....	295	98	...do....	July 25	362	95½	Fair.
Burpee's Superior	...do..	...do....	...do....	261	98	...do....	...do....	339	91½	Excellent.
Russet Rural	...do..	...do....	July 30	240	96	...do....	July 31	243	93	Poor.
Dearborn	...do..	...do....	...do....	235	95	...do....	...do....	313	87½	Fair.
Olds's Prolific	...do..	...do....	...do....	200	96	...do....	July 29	357	94	Good.
White Beauty	...do..	...do....	July 24	361	98	...do....	July 25	331	93½	Do.
Producer	...do..	...do....	July 30	270	94	...do....	July 29	373	93	Do.
Hundredfold	...do..	...do....	July 24	258	91	...do....	...do....	316	91	Fair.
White Star	...do..	...do....	...do....	181	90	...do....	...do....	312	99	Good.
Northern King	Pink..	...do....	July 30	337	94	...do....	...do....	286	99	Fair.
Bliss Triumph	...do..	...do....	Aug. 10	257	86	...do....	Aug. 5	415	99	Poor.
Knowles' Big Cropper.	White.	...do....	July 30	166	93	...do....	Aug. 1	207	99	Fair.
Olds' Select Rural	...do..	...do....	July 24	292	88	...do....	July 29	442	91	Good.
Pride of France	Red...	...do....	July 30	194	88	...do....	...do....	203	89	Poor.
Nebraska	White.	...do....	July 24	247	99	May 21	Aug. 5	315	94½	Do.
Epicure	Pink..	...do....	...do....	254	83	...do....	July 29	93	93	Do.
Snowflake	White.	...do....	July 30	135	97½	...do....	Aug. 5	250	94	Do.
Peachblow	Pink..	...do....	July 24	91	74	...do....	July 29	229	96½	Fair.
New Queen	...do..	...do....	...do....	73	96	...do....	...do....	298	92	Poor.
Matanuska	White.	May 23	...do....	333	96	...do....	July 20	280	95	Excellent.

It is noted that the calculated yield per acre is quite uniformly larger this year than in 1918. Potatoes are judged here almost entirely by their edible qualities, the prime requisite being that when cooked they shall be mealy, white, and of good flavor. The test has gone far enough now to permit the elimination of those varieties which have shown themselves unsuited to local conditions. In order that the quality might be judged, a sample of each variety was boiled and classed according to the results obtained, as excellent, good, fair, or poor. All of the best varieties were also given a baking test. The varieties classed as excellent are all fine potatoes. It is somewhat difficult to determine the order of excellence without a more prolonged test, but at present the potatoes can be placed in the following order: White Bliss, Irish Cobbler, American Wonder, Rural New Yorker, Early John, Burpee's Superior, Green Mountain, and Matanuska. The latter is the variety most widely grown locally. Its origin is not well authenticated, but it has been grown here for seven or eight years and is thoroughly acclimated. It is really a splendid potato, but is put at the bottom of the list because of a tendency to turn dark when standing awhile after being cooked. The 10 seedlings, known at present by number only, have not yet developed any potatoes of superior merit.

ROOT CROPS FOR STOCK.

Root crops will be an important part of a ration for live stock, and several varieties of mangels are being tested in order that it may be learned which are best suited to this region. This year a row 170 feet long of each of the following varieties was seeded: Improved Mammoth Long Red, Golden Tankard, Mammoth Golden Giant, and Yellow Globe. The yield was rather disappointing, being only a little over 5 tons per acre for all but the Golden Tankard which gave a yield of 8.5 tons. Giant Feeding sugar beet yielded at the rate of 8.3 tons per acre, and Mastodon carrot 2.6 tons.

Rutabagas were seeded broadcast on new ground June 2. This was moist ground and the seed germinated promptly, but the crop was poor on account of unfavorable soil condition.

Good results were obtained from Petrowski turnips seeded as late as the early part of July. They do not keep as well as the mangels and rutabagas, but are easily grown and make good feed for cattle and sheep during the early part of the winter.

SUGAR BEETS.

Eight rows each 170 feet long were seeded May 17 on ground that had been manured and then fall plowed. Half of the plat had a slight slope toward the north, the rest a slight slope to the south. The weather was too dry to get quick germination and the seed was a long time coming up. The plants were thinned to 6 inches apart in the row and hoed four or five times during the summer. On the north slope the plants did not grow more than 4 or 5 inches high and the crop was practically a failure. On the south slope the tops were normal size and the best beets weighed 1¼ pounds. Not all of the crop was pulled, but the yield of the best part of the plat was estimated at 5 tons per acre. The following table shows the results of analyses of six samples of the beets sent to the United States Department of Agriculture, Washington, D. C.:

Results of analyses of sugar beets grown at Matanuska Station.

Sample No.	Number of beets in sample.	Average weight.	Sucrose in juice.	Coefficient of purity.	Sample No.	Number of beets in sample.	Average weight.	Sucrose in juice.	Coefficient of purity.
		Pound.	*Per cent.*				*Pound.*	*Per cent.*	
1	4	0.90	17.00	82.3	4	3	0.85	17.20	78.9
2	3	.85	18.00	80.7	5	3	.75	21.40	82.9
3	3	.75	19.75	83.3	6	3	.90	17.00	79.1

Dr. C. O. Townsend, pathologist in charge of sugar-plant investigations, Bureau of Plant Industry, comments as follows on the results:

> These samples were reported in good condition by the chemist who made the analysis. Each sample had lost a small amount of moisture on account of the long distance they traveled, but apparently not enough to make any serious difference in the test. You will note that the sugar content in each case was very satisfactory from the sugar-making standpoint. The purities were up to or above the standard of 80 in four of the six samples. The average weight of the roots would indicate that they were rather small for satisfactory tonnage in commercial beet production. However, the results on the whole were very satisfactory.

Fifty beets of the crop of 1918 were set out May 20 for the purpose of seed growing. The experiment was not a success this year. The beets grew tops 5 feet high and set plenty of seed, none of which ripened. Another trial will be made next year.

THE NURSERY.

The snowfall was so light that things in the nursery received very little winter protection. The apple trees set out in 1918 survived the winter with only a fair degree of success. The Livland (Lowland) Raspberry froze back entirely but grew again from the root. Keswick suffered the same fate. Part of the tops of a few Whitney crab trees survived, but most of them froze to the ground. The Golden Sweet stood the winter better than the Whitney crab. Some froze back entirely, but quite a number survived with part of the top alive. These trees made a nice growth, some new growth 18 inches long being noted. The Yellow Transparent was least affected by the winter weather. Several of the trees suffered scarcely any injury at all and most of them froze back only partly. Many of the new shoots are 2 feet long.

The red, white, and black currants came through the winter without freezing back to any extent, but they produced very little fruit. All made good growth this summer. The black currant is a very rampant grower.

The gooseberries froze back quite severely, yet several of the bushes bore some fruit.

The red raspberries froze back to a considerable extent, but some fruit was produced. The bushes made a splendid growth this summer, the canes reaching a height of 4 to 5 feet. Several hundred young plants were transplanted in the early summer.

The Japanese honeysuckle was nearly winterkilled, but the Tartarian honeysuckle made good growth and bloomed freely.

Rosa rugosa stood the winter perfectly. It grew stems 2 feet long this summer and bloomed quite freely.

The few strawberry plants which grew out of the several mail shipments received from the Sitka Station in 1918 survived the winter in perfect condition without any artificial protection. The runners were allowed to root in order that the station might have plants to set out the next spring. One shipment of plants received from the Sitka Station this summer did not grow. Two hundred and fifty plants, transplanted June 12, made a splendid start. Strawberries do well here and the fruit commands a good price. This summer local berries sold in Anchorage at 50 cents for a pint and a half.

VEGETABLES.

Peas.—Alaska, Premium Gem, and Dwarf Gray Sugar, planted May 8, produced peas of edible size by August 1. The Dwarf Gray Sugar is an edible pod variety. When cooked in the pod it makes an acceptable substitute for string beans. Seed of all the varieties was saved.

String beans.—Stringless Green Pod and Extra Early Valentine, both bush varieties, were planted May 10. The seed was soaked before planting but still it was very slow to come up. Though the summer was hardly warm enough to enable the beans to do well, they produced a fair crop, and the first picking was made August 20.

Carrots.—Danvers Half Long and Oxheart were seeded May 17. Owing to the dry weather, germination was slow, but a fair crop was produced. These are both good varieties for this region.

Parsnips.—Sweet Marrow, seeded in moist ground May 17, made only a few roots of good size. Considerable care is needed to grow this vegetable successfully.

Salsify.—Sandwich Island was seeded in moist soil May 17. This is the first trial here of this vegetable, and it was not a success. Only a few small roots were produced.

Cauliflower.—Snowball and Model were the varieties tried and both seemed equally good. On June 7, 200 plants were set out; by July 20 the first heads were ready for use, and the crop then matured rapidly.

Cabbage.—Washington Wakefield, Copenhagen Market, and Holland were transplanted June 9 and 10. The first heads of Wakefield were ready for use August 5, and nearly every plant made a fine, solid head. A few heads of the Copenhagen Market were ready for use as early as the Wakefield, but most of the plants did not head until later. The best heads weighed from 16 to 18 pounds. This is a splendid variety for this region and it will keep in the cellar until the first of April. The Holland did not head at all.

Rhubarb.—The roots which were set out in 1918 yielded a good supply of stalks. It is put up in various ways for winter use. This plant grows well here though it has a marked tendency to produce seed stalks.

GENERAL FARMING CONDITIONS.

In the past year very little change has taken place in the number of persons still holding possession of homesteads. Numerous applications for patents have been made and several persons have secured title to their land.

Potatoes still continue to be the principal money crop of the farmers. The acreage was small this year compared with that of two years ago and the crop generally was light, although a few farmers had good yield. Some loss of potatoes occurred on account of the early freeze. The total crop is estimated at 250 tons. Potatoes are now selling at $50 to $60 per ton.

Nearly all of the cleared land in the country was planted to some sort of a crop, in most cases to grain. Dry weather in the early part of the season caused many partial and a few complete failures. Fall plowing has not yet become a general practice among the farmers, many of whom have to seed their grain broadcast and harrow it in. When the ground is spring plowed and the grain seeded in this manner considerable loss is sure to result if the weather happens to turn dry.

The greater part of the grain was cured for hay. It is estimated that about 150 tons was made, or just about enough to feed the stock in the country. It is impossible to estimate how much of the grain was saved for seed. Every year a number of tons of seed grain is shipped into the country from the outside. This should not be necessary. The farmers are constantly being urged to save more seed, but the usual excuse is that it is too much bother to thrash and clean it by hand. Now that the station has a thrashing machine it is hoped the farmers will take more interest in saving home-grown seed.

Seed grain was given to those farmers who failed to get an allotment last year.

A number of farmers are raising hogs, but so many are inadequately prepared for the business and lack of the proper feed that considerable doubt arises whether it is a profitable undertaking for them. A few of the farmers are making some money at the business, and it is estimated that 100 head have been butchered since early fall. One farmer alone had 50 carcasses. Fresh pork has found ready sale at 35 to 40 cents per pound.

The country now has 7 cows and 10 head of young stock, practically no increase having taken place since last year. About 20 of the ranchers have chickens.

In the line of improved machinery it may be mentioned that one farmer has purchased a binder and a grain drill.

The clearing of new land is going on rather slowly. Some settlers would do more clearing, but can get no burns; others have their time largely taken up with caring for crops; and still others work away from home most of the time. The construction of the Government railroad created quite a demand for laborers during the past year. It is anticipated that agricultural development will be rather slow for the next few years unless more settlers come into the country with the means to go ahead with improvements.

REPORTS FROM SEED AND PLANT DISTRIBUTION.

The following letters, giving actual experiences of settlers located in various parts of the Territory, will probably be of interest to those who wish to know something of farm life in Alaska.

Mrs. H. Pingel, Bettles, Alaska.—This is called the most northern mining camp of Alaska. It is 70 miles north of the Arctic Circle and the ground is known to be frozen from the surface to a depth of 362 feet. In summer the ground thaws only a few feet deep. The water flowing through streams and ditches is all supplied by glaciers. The soil contains much lime and therefore requires from three to four years of cultivation in order that good results may be obtained. From November 1 to February 6 the sun does not shine on our house. Between the middle of May and the 1st of June the ground in some places can be spaded up for planting. This leaves our season for gardening from June to September, during which time we are blessed with much sunshine.

The United States Department of Agriculture sends a supply of seeds every year to all who care to make a garden. Were it not for these seeds many a garden could not be planted, because there are none to be bought, and it would take six months to get seed from Seattle. In April we make hot boxes and cover them with glass and cloth sashes. We also start some plants and potatoes sprouting in the house. Head lettuce and greens, including celery, grow fine. Turnips can be depended on as a standard crop.

Six miles below us is the town of Wiseman, which is located on the bank of the Middle Fork of the Koyukuk River, and on a level of about 500 feet lower than Nolan Creek. This difference in altitude seems to account for their larger crops of potatoes and fine cabbage heads. The potatoes sell for 15 cents per pound and the cabbage for 20 cents per pound.

James L. Brown, Bethel, Alaska.—Our gardens for the season of 1919 were the best ever seen here. Potatoes, turnips, and cabbage yielded heavily. Black currants were good, but the red currants did not bear as the blossoms fell off too soon. Flowers were the best ever and my wild rose bush produced 26 blossoms. I should like to have some Petrowski turnip seed.

Arthur F. Butzin, Bethel, Alaska.—For some years we have been making gardens and have succeeded in raising most of the vegetables used on our table. Thus far tomatoes, beans, cucumbers, and their immediate kin have proved failures. We have about 20 hens which are largely kept in greens from the garden. In return they furnish a large share of the fertilizer. In addition to the insufficient quantity of Government seed sent us free of charge, we have purchased seed from ——— and have found them uniformly reliable. The White Icicle radish is very good. The Hanson is a splendid, solid, crisp head lettuce. Burpee's Wayahead furnished much earlier head lettuce, but has a slight tendency to run to seed. We also find Swiss chard a useful vegetable. It grows easily, can be used for greens in summer, and canned for winter use. Practically all varieties of beets tried thus far, with the exception of Early Model, have failed, owing to their seed-going tendencies. Danvers Half Long and Chantenay produced a good crop of fair-sized carrots. Thus far, Golden Neckless has proved our best rutabaga. We have had no success with parsnips. Early Jersey Wakefield remains with us the all around standard and dependable variety among the cabbages. Both cabbage and cauliflower are troubled by root maggots, but we find that by the application of an emulsion of crude carbolic acid we can overcome the pest almost altogether. This emulsion is made by dissolving 1 pound of hard soap, or 1 quart of soft soap, in a gallon of boiling water, to which 1 pint of crude carbolic acid is added, the whole being stirred into an emulsion. One part of this is added to about 35 parts of water and poured around the bases of the plants, about four ounces at each application, beginning when the plants are set out until the last of May. We usually watch for the first deposit of eggs and continue these applications for about a month, or until the danger of the maggot seems past.

F. M. Leach, Circle, Alaska.—I received some Petrowski turnip seed and have produced from that start about 10 pounds of seed. I find this turnip superior to any other for my use here. I am trying two varieties of hybrid barley from the Fairbanks Station, one of which is doing fine while the other is of questionable value. The greatest problem of the farmer of interior Alaska is how to obtain fertilizer. I offer the following solution: The "Nigger-head" swamps throughout the interior contain from 1 to 8 feet of tough, undecayed turf, almost a vegetable felt. I put a layer of this turf on very warm ground; over this I sprinkle a little hydrated lime, just enough to neutralize acidity; then over this, about 1 inch of fresh horse manure to inoculate with fungus. I repeat this process, placing one layer upon another, until my limited amount of horse manure is all used. This mass will then rapidly decay with the aid of a very little moisture, and furnishes a satisfactory fertilizer at moderate cost.

M. Peters, Deadwood, Alaska.—I can assure you that I have made good use of the seeds you sent me this past season. I have experimented with drying various vegetables and the results have been quite satisfactory. Potatoes were only successfully dried after first being boiled, when they dry readily and keep well. Cabbage, kale, turnips, both roots and top, dried nicely, the weight in many cases being reduced fully nine-tenths. In using they have to be soaked several hours and then boiled quite a long time. I used no salt, as this would only draw moisture.

David Liles, Homer, Alaska.—I planted the seed from one head of wheat the 1st of May and it has matured. The grain is very large and plump. My oats also ripened and I will send you a few samples. I planted my potatoes May 14, and they were excellent. The strawberries you sent me were all dead but I saved three gooseberry bushes. I appreciate the flower seeds very much. They call my place California when the flowers are in full bloom.

Mrs. C. E. Sydnor, Kake, Alaska.—I am writing in regard to the berries and shrubs you sent me. I think the gooseberries and currants did better than anything else, as they made a growth of 6 or 8 inches and some of the vines bore fruit. All the strawberry plants you sent me grew and seemed to be hardy plants. The apple trees are still alive, but they did not produce. I gave cuttings of the raspberries to the natives who were going out to their gardens, nearly all of whom gave good reports of them.

H. R. Ahrens, Nome, Alaska.—Before the mining season opens I have time to cultivate a garden 12 by 30 feet. It is situated on the bank of Harris Creek, 100 miles north of Nome, about 60 miles from Bering Strait, and 800 feet above sea level. The soil is sandy mixed with layers of decayed vegetation. Weather conditions are not always the best for gardening, and last summer was so cold that even the mosquitoes did not come out. Turnips, lettuce, and radishes planted June 7 came up in nine days, and I had radishes 40 days later. I harvested the turnips October 1 and got 200 pounds. Petrowski seems to be the best turnip for this country. Peas, beets, and collards made too slow growth to produce this year. I set out sprouted potatoes June 27. Five out of seven hills were in bloom August 10. August 14 a heavy frost killed even the potatoes under cover. The largest potato was only the size of a hen's egg, but all were the best tasting potatoes I ever ate. There are three more gardens on this creek and one man raised a fine crop of spinach last summer.

William Yanert, Purgatory, Alaska.—Petrowski turnip seed was planted June 6 in ground well drained and to some extent manured. The soil is a mixture of silt and muck. We had a frost on August 31 and took up the turnips September 2. They were of excellent quality, of an average size of 3 inches and untouched by maggots.

Thomas A. Power, Unalaklik, Alaska.—Turnips and potatoes do well here and are the favorites, but the hardier vegetables are also grown with but little attention to cultivation. Cabbages and cauliflower can be headed by using a hothouse in which to start them. The Petrowski turnip is a splendid success. Last summer the writer sowed a patch of newly broken ground about 20 by 30 feet from which enough turnips were produced to supply 10 people all winter. Some were as large as a man's head. The potatoes grown here are of exceptional quality.

WEATHER REPORTS.

The following pages contain condensed meteorological data from each of the stations named. Each station can be located by its latitude and longitude on a map of Alaska. The data presented will enable the reader to form some idea of the climate at the places named.

Condensed meteorological reports.

Month.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Mean maximum.	Temperature. Mean minimum.	Temperature. Daily mean.	Total precipitation.	Number of days— Clear.	Number of days— Partly cloudy.	Number of days— Cloudy.	Number of days— Rain or snow.
ALLAKAKET. Latitude 66° 34′, longitude 152° 44′. Eleanor J. Ridgway, observer.										
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	28	−69	−12.1	−32.4	−22.2	0.55	15	4	12	6
February	14	....	1.9	....	....	.14	15	9	4	3
March	24	....	12.1	....	....	.15	21	3	7	3
April	49	−30	34.5	2.1	18.3	.27	15	7	8	3
May	70	9	55.4	32.0	43.7	T.	11	13	5	....
June	74	27	61.0	38.4	49.7	4.14	9	10	11	....
July	88	37	71.9	46.8	59.4	2.93	9	12	10	....
August	86	28	63.4	41.4	52.4	1.38	8	7	13	4
September	62	16	50.7	31.1	40.9	2.40	6	9	12	4
October	39	−17	28.2	11.5	19.8	.72	13	2	14	....
November	16	−41	0.9	−13.7	−6.4	1.27	15	2	13	5
December	34	−60	−6.1	−22.5	−14.3	1.04	11	5	15	4
ANCHORAGE. Latitude 61° 13′, longitude 149° 52′. Victor E. Meyers, observer.										
January	40	−33	15.5	−1.3	7.1	0.90	4	2	25	14
February	38	−11	29.1	7.0	18.0	.10	10	8	10	4
March	44	−19	32.0	8.2	20.1	.15	13	9	9	3
April	48	17	44.0	26.3	35.2	.23	12	6	12	6
May	66	24	55.0	32.8	43.9	.14	13	12	6	4
June	71	31	64.4	41.8	53.1	.24	18	6	6	4
July	79	41	69.8	48.8	59.3	3.01	8	4	19	14
August	80	36	65.1	46.1	55.6	3.42	5	3	23	18
September	70	21	58.1	40.1	49.1	2.63	7	2	21	22
October	57	10	41.7	26.7	34.2	1.89	4	14	13	17
November	33	−14	25.6	7.9	16.8	1.53	7	2	21	10
December	44	−22	19.3	2.9	10.6	3.49	8	7	16	10
CALDER. Latitude 56° 10′, longitude 133° 27′. John McCallum, observer.										
January	49	15	37.7	29.1	33.4	15.30	3	13	15	28
February	42	7	35.4	27.5	31.4	9.62	7	9	12	17
March	46	7	37.3	24.1	30.7	9.41	8	9	14	19
April	59	29	47.5	34.8	41.2	8.30	1	9	20	26
May	59	26	52.4	34.8	43.6	8.92	7	13	11	20
June	68	34	57.5	41.2	49.4	2.93	11	9	10	13
July	65	41	58.8	47.4	53.1	3.41	5	10	16	18
August	75	36	62.6	47.4	55.0	3.69	9	13	9	15
September	76	33	61.2	43.8	52.5	7.54	9	6	15	17
October	55	25	47.4	36.3	41.8	7.34	6	5	20	17
November	45	16	36.6	26.9	31.8	12.36	11	7	12	17
December	50	8	35.1	26.1	30.6	14.02	12	0	19	14
CANDLE. Latitude 65° 55′, longitude 161° 57′. R. S. Dimmick, observer.										
January	30	−60	−11.8	−21.8	−16.8	....	13	1	17	....
February	26	−38	−5.4	−17.2	−11.3	....	9	3	16	....
March	30	−30	10.2	7.9	9.0	....	16	4	8	....
April	40	−22	17.5	−4.9	6.3	....	18	1	11	....
May	60	−8	44.8	22.3	33.6	0.16	13	7	11	2
June	60	28	47.9	34.8	41.4	.99	7	1	22	10
July	83	32	59.2	42.8	51.0	1.33	15	1	15	11
August	72	29	57.4	40.4	48.9	1.31	4	4	23	13
September	67	20	49.3	33.6	41.4	2.23	1	3	26	16
October	47	5	32.4	21.0	26.7	.73	5	3	23	6
November	34	−18	19.1	5.5	12.3	....	7	2	21	....
December	35	−47	8.0	−5.1	1.4	....	13	2	16	....

Condensed meteorological reports—Continued.

CHICKALOON. Latitude 61° 48′, longitude 148° 27′. J. E. Manning, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°F.	°F.	°F.	°F.	Inches.					
January	30	−42	7.1	−8.5	−0.7	....	11	13	7	....
February	37	−15	27.0	3.6	15.3	T.	18	7	3	0
March	43	−15	31.1	5.8	18.4	....	21	7	3	....
April	54	13	46.2	24.1	35.2	0	19	9	2	0
May	65	20	57.9	32.2	45.0	0.10	16	10	5	4
June	72	28	62.8	38.0	50.4	.75	6	5	19	3
July	80	39	67.3	45.7	56.5	1.83	10	3	18	6
August	80	32	62.3	41.3	51.8	1.80	9	3	19	4
September	64	24	54.3	35.4	44.8	....	8	3	19	....
October	46	8	37.5	24.2	30.9	.44	5	5	21	4
November	38	−12	26.9	6.7	16.8	....	13	2	15	....
December	37	−27	16.6	−1.9	7.4	....	9	0	18	....

CHITINA. Latitude 61° 32′, longitude 144° 27′. A. G. Morey, observer.

January	41	−41	5.2	−9.2	−2.0	0.89	11	16	4	7
February	33	−27	10.2	−10.3	0	.04	16	8	4	2
March	43	−30	25.3	−4.4	10.4	.03	19	8	4	2
April	50	18	44.7	27.3	36.0	.02	21	7	2	1
May	65	22	55.5	34.9	45.2	.02	25	6	0	1
June	71	33	62.4	42.7	52.6	1.03	18	7	5	9
July	87	41	67.0	47.7	57.4	2.03	19	10	2	11
August	73	30	62.7	45.7	54.2	.88	11	16	4	6
September	71	22	56.6	38.9	47.8	1.98	10	11	9	10
October	49	5	37.1	21.8	29.4	.89	9	14	8	7
November	38	−31	14.0	−2.4	5.8	.59	12	5	13	4
December	40	−33	8.1	−8.9	−.4	1.77	10	9	12	6

CORDOVA. Latitude 60° 32′, longitude 145° 46′. R. E. Elsner, observer.

January	40	−7	29.4	21.2	25.3	10.45	7	10	14	23
February	38	4	34.4	25.1	29.8	6.68	11	7	10	19
March	43	2	34.8	20.8	27.8	2.29	15	8	8	14
April	47	24	42.2	31.9	37.0	13.53	11	4	15	22
May	60	29	50.6	36.5	43.6	4.57	13	7	11	18
June	66	38	55.3	43.8	49.6	5.03	14	7	9	11
July	72	46	60.0	49.1	54.6	3.16	11	12	8	16
August	62	39	56.0	48.5	52.2	19.43	8	11	12	19
September	66	32	55.3	43.3	49.3	13.37	9	10	11	16
October	50	27	43.6	35.1	39.4	6.12	15	6	10	16
November	45	13	35.2	25.5	30.4	9.57	14	7	9	14
December	43	4	32.8	22.7	27.8	16.97	8	3	20	20

DUTCH HARBOR. Latitude 53° 54′, longitude 166° 32′. Emil Ittner, observer.

January	40	5	26.9	20.0	23.4	7.98	1	3	27	26
February	40	10	32.5	24.5	28.5	4.54	3	5	20	27
March	45	24	37.4	31.3	34.4	7.67	3	6	22	21
April	46	24	37.2	29.5	33.4	4.30	3	3	24	8
May	49	32	44.0	35.1	39.6	5.17	4	6	21	21
June	64	33	52.0	40.7	46.4	.31	10	6	11	2
July	80	40	57.6	46.9	52.2	2.96	5	10	16	14
August	73	42	56.9	46.9	51.9	4.58	5	5	21	18
September	64	36	54.7	43.6	49.2	3.88	2	8	20	17
October	61	30	48.8	38.5	43.6	9.38	4	9	18	20
November	48	22	41.2	32.3	36.8	2.27	7	5	18	17

Condensed meteorological reports—Continued.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
EAGLE. Latitude 64° 46′, longitude 141° 12′. Eliza Turnbull, observer.										
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	26	−52	−2.9	−18.6	−10.8	0.22	7	15	9	5
February	27	−32	9.6	− 6.9	1.4	.05	17	5	6	1
March	44	−40	16.5	−11.6	2.4	.02	17	5	9	1
April	53	− 4	42.3	17.9	30.1	.40	7	13	10	5
May	69	17	55.1	30.5	42.8	1.09	4	13	14	15
June	79	28	62.5	40.0	51.2	1.58	2	7	21	18
July	86	38	71.7	47.4	59.6	1.72	4	8	19	12
August	84	32	69.6	44.3	57.0	2.39	2	14	15	17
September	73	24	54.8	34.6	44.7	1.23	5	5	20	13
October	48	− 8	30.2	13.9	22.0	.25	9	7	15	7
November	19	−47	11.4	− 9.3	− 4.0	.78	7	3	20	10
AGRICULTURAL EXPERIMENT STATION, FAIRBANKS. Latitude 64° 51′, longitude 147° 52′. M. D. Snodgrass, observer.										
January	28	−56	− 4.7	−23.6	−14.2	0.18	8	8	15	4
February	26	−26	12.5	− 8.5	2.0	0	25	1	2	0
March	30	−25	15.2	− 7.0	4.1	T.	20	4	7	0
April	55	5	46.0	20.6	33.3	.11	12	17	1	2
May	78	21	63.3	35.3	49.3	1.38	5	22	4	9
June	87	31	64.4	41.0	52.7	2.08	4	19	7	12
July	99	42	74.9	50.8	62.8	2.79	17	7	7	16
August	87	34	71.0	45.5	58.2	1.02	10	14	7	7
September	76	19	58.3	35.8	47.0	1.03	7	8	15	11
October	57	− 2	34.5	17.6	26.0	.95	12	5	14	7
November	23	−35	7.2	− 4.6	1.3	1.19	10	3	17	11
December	31	−42	2.9	−13.1	− 5.1	.71	12	8	11	6
FORTMAN SALMON HATCHERY. Latitude 55° 36′, longitude 131° 25′. Fred Patching, observer.										
January	49	9	37.5	26.6	32.0	18.52	1	4	26	25
February	45	− 6	37.1	23.5	30.3	11.26	6	7	15	18
March	47	− 1	40.3	21.3	30.8	11.55	5	5	21	18
April	61	25	50.6	32.7	41.6	9.92	1	3	26	29
May	69	26	56.2	36.3	46.2	11.26	1	14	16	24
June	74	36	61.9	43.7	52.8	4.53	5	6	19	20
July	80	46	66.6	50.3	58.4	1.36	5	6	20	13
August	82	42	71.1	49.8	60.4	5.98	8	8	15	18
September	84	34	65.6	46.3	56.0	7.38	10	2	18	17
October	60	23	50.5	36.7	43.6	7.43	5	8	18	23
November	55	14	40.4	27.7	34.2	18.32	7	5	18	19
December	49	0	35.4	23.7	29.6	15.74	8	2	21	16
FORT YUKON. Latitude 66° 34′, longitude 145° 18′. Winifred Dalzell, observer.										
January	19	−62	−11.8	−28.2	−20.0	0.56	11	6	12	10
February	13	−39	1.0	−20.4	− 9.7	.08	21	3	4	1
March	21	−38	7.2	−19.8	− 6.3	.16	25	1	5	2
April	56	−19	38.1	10.2	24.2	T.	17	2	10	0
May	70	15	55.4	29.4	42.4	.10	18	5	8	3
June	80	32	62.0	43.9	53.0	.91	3	4	23	14
July	88	47	73.3	55.0	64.2	.55	7	10	14	10
August	83	31	68.2	48.9	58.6	.98	8	7	16	10
September	73	26	53.8	34.8	44.3	.56	6	11	13	8
October	47	− 4	29.8	16.4	23.1	.19	12	9	9	6
November	14	−42	− 3.9	−19.6	−11.8	.34	8	10	12	10
December	35	−57	−12.0	−27.2	−19.6	1.07	16	3	12	10

Condensed meteorological reports—Continued.

GOOD NEWS BAY. Latitude 59° 7′, longitude 161° 33′. F. M. Gwin, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	41	−52	6.5	− 6.5	0	0.94	19	0	12	11
February	38	−17	24.3	9.5	16.9	.61	16	2	10	7
March	43	−17	25.6	14.3	20.0	1.03	14	3	14	6
April	49	− 4	28.4	17.3	22.8	.69	12	2	16	6
May	62	22	47.4	33.1	40.2	.93	17	2	12	6
June	68	33	53.3	38.2	45.8	1.13	6	4	20	11

HENDERSON BAY. Latitude 55° 51′, longitude 160° 20′. G. R. Cunningham, observer.

January	40	18	22.7	10.8	16.8	2.52	8	9	14	12
February	42	4	32.0	21.6	26.8	2.92	7	10	11	16
March	44	24	38.5	30.2	34.4	3.25	8	14	9	19
April	46	20	38.1	27.3	32.7	1.09	5	12	13	4
May	54	30	43.8	35.1	39.4	3.24	3	7	20	21

HOLY CROSS. Latitude 62° 12′, longitude 159° 50′. Sister Mary Thecla, observer.

January	31	−58	− 1.5	−15.3	− 8.4	....	24	1	6	....
February	39	−23	15.2	− 3.8	5.7	0.01	26	0	2	1
March	39	−12	23.4	9.8	16.6	.17	25	3	3	3
April	48	0	37.5	19.5	28.5	.06	26	1	3	1
May	65	19	55.7	34.4	45.0	.66	24	4	3	7
June	68	31	58.1	39.9	49.0	1.43	16	2	12	13
July	83	42	64.7	48.3	56.5	6.49	8	9	14	17
August	72	32	61.5	45.5	53.5	4.15	9	3	19	20
September	64	20	47.5	36.3	41.9	1.10	13	10	7	8
October	54	9	36.4	24.3	30.4	3.05	13	1	17	12
November	39	−26	20.2	8.5	14.4	1.78	23	3	4	5
December	39	−34	12.7	−.6	6.0	....	24	2	5	....

INDIAN RIVER. Latitude 60° 50′, longitude 149° 38′. A. F. Stowe, observer.

January	34	−49	14.5	− 5.9	4.3	1.89	15	3	13	9
February	40	−14	28.3	4.9	16.6	.08	15	7	6	1
March	40	−19	30.9	6.6	18.8	1.40	19	4	8	6
April	57	12	48.0	23.9	36.0	.96	17	5	8	10
May	68	22	58.7	32.4	46.0	1.55	10	11	10	9
June	73	29	63.4	40.6	52.0	1.66	9	10	11	13
July	89	38	67.3	46.5	56.9	2.84	11	4	16	20
August	73	32	61.7	43.6	52.6	3.23	10	11	10	22
September	67	20	51.8	36.2	44.0	7.44	6	2	22	21
October	52	0	36.6	22.2	29.4	3.90	11	9	11	12
November	38	−16	23.9	6.1	15.0	.88	8	9	13	6
December	34	−36	16.4	− 1.0	7.7	3.75	14	4	13	11

JUNEAU. Latitude 58° 18′, longitude 134° 24′. M. B. Summers, observer.

January	46	14	35.8	28.3	32.0	11.41	5	2	24	26
February	43	9	34.0	26.2	30.1	3.07	7	4	17	15
March	50	7	32.8	23.6	28.2	4.43	7	9	15	15
April	57	29	48.8	35.9	42.4	6.50	3	3	24	25
May	63	29	54.6	37.8	46.2	4.96	3	8	20	21
June	68	38	58.1	44.9	51.5	3.73	2	6	22	18
July	85	47	60.3	49.5	54.9	6.39	3	3	25	25
August	74	39	62.5	48.6	55.6	5.91	5	6	20	17
September	69	35	59.2	44.4	51.8	11.35	11	2	17	17
October	56	25	44.9	36.0	40.4	12.49	2	5	24	22
November	50	14	35.1	25.7	30.4	9.93	10	3	17	17
December	46	14	34.0	25.3	29.6	7.69	4	2	25	22

Condensed meteorological reports—Continued.

KETCHIKAN. Latitude 55° 20′, longitude 131° 37′. A. P. Craig, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°F.	°F.	°F.	°F.	Inches.					
January	55	17	40.4	30.3	35.4	18.44	3	3	25	28
February	46	4	38.8	26.7	32.8	8.75	7	5	16	17
March	49	10	41.0	25.9	33.4	10.21	9	6	16	18
April	58	28	49.3	35.2	42.2	11.76	4	3	23	26
May	64	29	54.4	37.1	45.6	9.77	7	5	19	22
June	73	37	59.8	42.9	51.4	5.14	8	4	18	20
July	77	43	63.6	48.8	56.2	3.72	6	4	21	17
August	83	36	67.9	50.3	59.1	7.10	11	4	16	17
September	78	34	63.5	45.8	54.6	10.64	10	3	17	21
October	58	24	49.7	36.8	43.3	8.56	6	4	21	27
November	53	16	40.5	29.1	34.8	15.62	12	1	17	21

KLUKWAN. Latitude 59° 24′, longitude 135° 54′. Rev. F. R. Falconer, observer.

January	42	−19	25.5	10.2	17.8	3.15	9	7	15	17
February	40	−22	27.6	9.1	18.4	.76	13	1	14	12
March	47	−20	31.0	8.6	19.8	1.00	18	3	10	7
April	56	24	48.4	31.8	40.1	.20	4	11	15	4
May	67	21	56.9	33.8	45.4	.33	15	5	11	6
June	....	....	....	....	....	....	....	....	....	....
July	96	38	63.8	53.2	58.5	1.14	....	....	....	8
August	76	33	66.6	43.9	55.2	.38	21	1	9	7
September	75	29	62.7	39.9	51.3	8.43	14	0	13	14
October	59	15	41.0	27.9	34.4	3.90	10	1	20	9
November	43	− 2	29.6	15.6	22.6	3.02	7	4	19	9
December	41	−12	23.4	9.1	16.2	3.89	9	2	20	12

AGRICULTURAL EXPERIMENT STATION, KODIAK. Latitude 57° 48′, longitude 152° 22′. W. T. White, observer.

January	41	− 4	28.6	....	....	4.13	....	....	....	16
February	48	19	40.4	27.4	33.9	....	....	....	....	....
March	49	21	40.8	28.1	34.4	....	....	....	....	....
April	50	28	43.4	31.4	37.4	4.32	4	9	16	16
May	54	32	44.8	36.6	40.7	7.57	6	4	21	20
June	68	37	60.1	45.0	52.6	2.40	12	9	9	9
July	74	42	61.5	48.9	55.2	6.49	10	3	18	15
August	81	36	59.3	47.7	53.5	8.76	7	13	11	20
September	63	37	55.0	43.8	49.4	5.98	8	11	11	14
October	....	29	....	37.4	....	6.45	7	9	15	18
November	45	17	38.2	29.8	34.0	6.13	10	3	17	13
December	42	5	36.2	25.4	30.8	3.54	11	4	16	1

LATOUCHE. Latitude 60° 03′, longitude 147° 55′. Chas. Johnson, observer.

January	38	1	30.0	23.2	26.6	15.51	5	7	19	24
February	41	23	35.4	29.6	32.5	16.88	7	5	16	20
March	46	16	36.7	27.2	32.0	7.33	13	3	15	13
April	53	28	43.6	31.7	37.6	17.78	9	2	19	20
May	59	30	50.1	36.0	43.0	4.36	4	10	17	18
June	69	36	57.5	....	....	1.28	12	2	12	6
July	68	....	59.0	....	....	5.33	6	4	21	11
August	....	41	....	48.5	....	22.21	6	3	22	21
September	....	35	....	44.0	....	22.08	7	3	20	20
October	....	29	....	36.1	....	11.71	6	8	17	20
November	46	21	36.6	29.3	33.0	12.23	7	6	17	17
December	44	9	34.2	24.7	29.4	12.40	2	1	28	18

Condensed meteorological reports—Continued.

AGRICULTURAL EXPERIMENT STATION, MATANUSKA. Latitude 61° 30′, longitude 149° 15′. F. E. Rader, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	39	−34	16.1	1.5	8.8	0.58	6	1	24	6
February	44	− 9	30.9	11.7	21.3	T.	13	7	8	0
March	43	−10	31.9	14.1	23.0	.09	14	7	10	1
April	52	11	47.3	28.3	37.8	0	13	8	9	0
May	69	27	58.2	35.8	47.0	.27	8	13	10	4
June	71	32	64.7	42.5	53.6	.87	4	14	12	8
July	80	42	67.8	48.5	58.1	2.00	8	10	13	9
August	70	33	62.8	46.5	54.6	2.23	6	8	17	11
September	65	24	55.0	38.6	46.8	1.90	6	4	20	11
October	59	10	40.0	26.6	33.3	1.62	4	6	21	12
November	38	−15	24.8	5.0	14.9	.46	8	5	17	3
December	42	−22	15.7	1.1	8.4	1.42	10	4	17	6

NAKNEK. Latitude 58° 41′, longitude 157°. V. L. Sedgwick, observer.

January	42	−43	11.6	− 3.5	4.0	0.40	11	3	17	5
February	41	−11	29.5	16.2	22.8	.41	11	4	13	4
March	39	− 3	32.6	17.6	25.1	1.02	10	6	15	7
April	45	17	38.7	25.9	32.3	.54	3	13	14	8
May	57	20	49.7	33.3	41.5	3.07	2	11	18	11
June	64	33	56.7	39.7	48.2	1.08	0	18	12	7
July	73	37	62.0	45.8	53.9	4.96	8	10	12	12
August	80	65	65.8	51.6	58.7	2.35	12	9	10	10
September	70	29	59.0	43.3	51.2	.29	6	7	16	9
October	76	15	44.6	31.0	37.8	4.40	13	9	9	11
November	44	− 3	27.2	15.3	21.2	....	15	6	9	....

NENANA. Latitude 64° 31′, longitude 149° 6′. M. C. Edmunds, observer.

January	32	−55	−2.3	−20.1	−11.2	0.16	8	12	11	2
February	26	−26	15.0	− 8.8	3.1	.00	17	7	4	0
March	38	−24	21.5	− 1.7	9.9	.03	20	5	6	2
April	55	5	44.4	20.0	32.2	T.	15	5	10	0
May	71	24	60.3	36.4	48.4	.82	7	10	14	4
June	77	35	62.0	44.2	53.1	3.07	5	6	19	14
July	89	43	75.0	52.1	63.6	2.34	11	10	10	17
August	80	37	68.3	47.1	57.7	1.93	6	12	13	10
September	69	20	56.1	36.7	46.4	1.70	7	6	17	11
October	49	2	35.0	21.7	28.4	.75	10	7	14	10
November	32	−31	7.7	− 4.8	1.4	.81	5	6	19	9
December	36	−51	6.6	−14.2	− 3.8	.83	6	6	19	5

NOME. Latitude 64° 30′, longitude 165° 24′. C. L. Loogren, observer.

January	30	−47	−1.2	−11.8	−5.3	0.30	20	4	7	4
February	36	−33	16.1	2.3	9.2	.26	8	5	15	4
March	38	−16	21.5	10.0	15.8	.15	8	8	15	1
April	36	− 8	24.4	7.9	16.2	.15	13	6	11	6
May	56	3	43.0	29.6	36.3	.37	7	9	15	4
June	55	30	44.7	35.7	40.2	1.79	4	2	24	12
July	74	36	54.5	44.3	49.4	3.69	5	6	20	14
August	62	25	53.6	41.5	47.6	2.81	10	5	16	12
September	57	25	46.1	35.5	40.8	2.65	5	2	23	12
October	44	8	32.1	21.4	26.8	2.86	8	3	20	13
November	34	−13	23.3	13.5	18.4	1.75	8	5	17	10

Condensed meteorological reports—Continued.

NULATO. Latitude, 64° 43′, longitude, 158° 4′. H. C. Randle, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°F.	°F.	°F.	°F.	Inches.					
January	25	−57	−4.2	−20.1	−12.2	1.04	13	4	14	10
February	22	−21	8.6	− 7.8	.4	.28	13	4	11	8
March	32	−27	17.2	− 5.8	5.7	.08	15	8	8	2
April	48	−15	32.4	8.6	20.5	.07	13	7	10	2
May	65	14	53.7	32.3	43.0	.63	3	14	14	9
June	66	26	57.7	39.2	48.4	.66	2	7	21	8
July	84	37	67.3	47.3	57.3	2.54	8	10	13	15
August	72	27	58.7	41.6	50.2	3.27	3	7	21	16
September	59	15	48.5	33.8	41.2	2.78	1	5	24	19
October	45	− 5	31.0	18.4	24.7	3.33	3	9	19	19
November	35	−30	11.6	− .5	5.6	1.24	6	5	19	13
December	35	−48	3.1	−11.1	− 4.0	1.26	11	3	17	7

AGRICULTURAL EXPERIMENT STATION, RAMPART. Latitude, 65° 30′, longitude, 150° 15′. G. W. Gasser, observer.

January	15	−63	−9.4	−23.1	−16.2	0.66	8	6	17	9
February	....	....	....	....	....	.05	9	9	10	1
March	....	....	....	....	....	.12	20	6	5	1
April	51	0	39.5	17.3	28.4	.10	13	7	10	1
May	67	18	56.6	32.4	44.5	.46	15	12	4	6
June	77	32	62.1	40.9	51.5	1.22	3	12	15	7
July	88	41	72.5	49.7	61.1	1.14	5	7	19	12
August	83	33	67.0	44.9	56.0	1.73	1	7	23	11
September	69	28	....	....	....	2.63	1	15	14	....
October	42	− 3	29.2	14.3	21.8	.61	8	3	20	10
November	29	−40	3.1	− 8.1	− 2.5	.97	3	3	24	5
December	36	−58	− .8	−17.6	− 8.4	1.17	8	4	19	7

SAINT PAUL ISLAND. Latitude, 57° 15′, longitude 170° 10″. Operator in charge naval radio station, observer.

January	34	−26	9.5	1.1	5.4	0.32	....	....	....	3
February	33	−13	20.9	11.0	16.0	1.48	....	....	....	11
March	40	8	32.6	23.9	28.2	1.80	....	....	....	12
April	38	7	26.6	18.0	22.3	.61	....	....	....	5
May	42	22	36.5	29.4	33.0	.44	....	....	....	3
June	55	29	44.7	36.6	40.6	.58	0	4	26	7
July	56	40	49.2	42.1	45.6	1.91	0	1	30	9
August	56	38	49.4	43.1	46.2	3.63	0	7	24	14

SELDOVIA. Latitude 59° 26′, longitude 151° 43′. E. R. Bogart, observer.

January	39	−10	26.4	15.6	21.0	5.31	6	9	16	21
February	47	5	35.9	23.6	29.8	6.76	7	12	9	16
March	46	10	38.9	22.9	30.9	.76	17	5	9	11
April	52	24	44.9	29.2	37.0	3.09	12	7	11	12
May	63	26	54.9	34.1	44.5	.02	12	13	6	1
June	73	32	63.6	41.6	52.6	1.55	18	4	8	5
July	79	41	65.6	46.7	56.1	2.00	13	2	16	11
August	76	33	62.9	47.4	55.2	2.10	8	8	15	14
September	65	28	56.1	41.4	48.8	8.96	7	9	14	19
October	55	24	45.8	33.9	39.8	3.70	11	8	12	14
November	46	1	36.3	22.2	29.2	1.91	12	1	17	12
December	46	3	30.5	20.1	25.3	3.23	9	1	21	14

Condensed meteorological reports—Continued.

SEWARD. Latitude 60° 6′, longitude 149° 27′. E. L. Sweek, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	39	−20	24.6	8.2	16.4	7.85	8	1	22	15
February	49	5	35.1	19.4	27.2	4.38	9	1	18	12
March	49	0	36.5	19.3	27.9	1.74	12	0	19	6
April	50	24	44.0	31.7	37.8	2.73	7	0	23	11
May	60	30	52.5	36.0	44.2	1.52	7	0	24	8
June	71	33	60.9	44.3	52.6	1.13	14	0	16	3
July	81	40	63.4	48.1	55.8	2.04	9	0	22	10
August	78	41	60.1	46.4	53.2	10.12	6	4	21	16
September	68	34	57.5	44.3	50.9	12.77	5	1	24	15
October	58	25	45.1	35.7	40.4	7.70	5	8	11	8
November	50	9	36.4	23.9	30.2	1.32	9	2	19	3
December	42	−2	28.8	17.9	23.4	5.90	11	0	20	7

SITKA. Latitude 57° 4′, longitude 125° 20′. C. C. Georgeson, observer.

January	50	19	40.5	29.9	35.2	10.34	3	6	22	22
February	50	15	40.3	29.1	34.7	3.08	7	4	17	13
March	54	7	40.2	27.2	33.7	4.12	11	4	16	18
April	56	29	49.2	35.2	42.2	3.95	2	10	18	21
May	62	29	53.7	37.1	45.4	3.27	5	9	17	17
June	66	38	56.8	43.5	50.2	1.69	4	11	15	17
July	70	45	59.4	49.1	54.2	2.87	1	2	28	20
August	74	40	62.7	49.7	56.2	5.15	5	4	22	18
September	74	35	61.0	45.7	53.4	8.04	9	6	15	19
October	60	25	50.5	38.5	44.5	13.89	2	13	16	23
November	52	18	42.3	28.6	35.4	9.22	11	4	15	17
December	50	15	39.6	29.2	34.4	7.92	8	2	21	20

SKAGWAY. Latitude 59° 27′, longitude 135° 19′. F. J. Vandewall, observer.

January	46	2	33.0	22.2	27.6	2.78	8	8	15	18
February	45	0	29.9	21.2	25.6	.30	10	9	9	7
March	52	0	30.5	19.2	24.8	.86	13	4	14	5
April	57	27	51.1	35.4	43.2	1.41	9	10	11	11
May	68	23	57.7	36.3	47.0	.45	12	12	7	6
June	74	31	63.6	45.1	54.4	.40	10	7	13	5
July	89	41	65.0	49.5	57.2	1.81	4	3	24	12
August	75	35	66.0	46.7	56.4	.80	8	12	11	8
September	71	29	60.3	41.6	51.0	5.96	11	2	17	12
October	59	21	44.2	32.4	38.3	3.01	4	4	23	11
November	45	5	30.9	21.2	26.0	3.95	14	2	14	11
December	45	4	31.6	18.4	25.0	2.39	7	3	21	12

STRELNA. Latitude 61° 32′, longitude 144° 6′. M. Dwyer, observer.

January	44	−45	6.3	−11.8	−2.8	....	....	....	....	....
February	38	−28	15.4	−11.3	2.0	....	....	....	....	....
March	45	−30	25.2	5.6	15.4	....	13	4	14	....
April	56	12	48.5	19.5	34.0	....	14	0	16	....
May	68	22	58.2	29.7	44.0	....	16	0	15	....
June	74	28	66.4	36.2	51.3	....	9	0	21	....
July	91	34	74.1	40.3	57.2	....	....	....	....	....
August	86	26	69.7	38.2	54.0	....	....	....	....	....
September	74	22	61.8	33.2	47.5	....	....	....	....	....
October	56	−2	40.4	20.4	30.4	....	6	0	25	....
November	36	−31	15.8	−6.4	4.7	....	13	0	17	4
December	43	−38	8.7	−1.2	3.8	....	....	....	....	....

Condensed meteorological reports—Continued.

TACOTNA. Latitude 63° 5′, longitude 155° 55′. O. R. Ebry, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	°*F.*	°*F.*	°*F.*	°*F.*	*Inches.*					
January	......	......	......	......	......	......	......	......	......	......
February	......	−33	......	−11.5	......	......	......	......	......	......
March	......	−36	......	− .1	......	......	......	......	......	......
April	52	− 5	42.4	16.3	29.4	0.10	......	......	......	2
May	70	25	58.6	34.2	46.4	.76	......	......	......	6
June	78	29	59.7	38.9	49.3	.34	......	......	......	4
July	86	37	65.6	46.0	55.8	2.65	......	......	......	15
August	78	28	60.4	42.2	51.3	3.90	......	......	......	18
September	......	......	......	......	......	......	......	......	......	......
October	......	......	......	......	......	......	......	......	......	......
November	......	......	......	......	......	......	......	......	......	......
December	......	−45	......	−14.7	......	......	14	0	17	......

TALKEETNA. Latitude 62° 30′, longitude 149° 40′. John F. Coffey, observer.

January	40	−48	19.5	− 4.4	7.6	......	14	1	16	......
February	48	−18	33.7	8.5	21.1	......	21	3	4	......
March	47	−24	34.6	11.0	22.8	......	19	3	9	......
April	59	15	48.3	27.4	37.8	T.	10	11	6	0
May	71	27	58.7	37.3	48.0	0.11	13	9	8	3
June	73	33	64.4	45.4	54.9	1.48	16	4	9	6
July	85	41	69.1	49.3	59.2	3.24	8	2	21	14
August	71	31	64.7	45.0	54.8	3.90	11	3	17	15
September	69	22	54.4	38.1	46.2	4.99	10	4	16	17
October	58	3	42.6	24.0	33.3	4.99	12	3	16	10
November	38	− 6	26.9	8.6	17.8	......	20	2	8	......
December	40	−27	16.0	− 3.0	6.5	......	11	8	12	......

TANANA. Latitude 65° 10′, longitude 152° 6′. James C. Dehn, observer.

January	22	−66	− 8.7	−20.1	−14.4	0.13	12	7	12	6
February	14	−28	6.3	− 5.6	.4	.03	9	13	6	2
March	34	−30	14.3	− 5.1	4.6	.10	15	6	10	3
April	50	− 5	37.6	14.9	26.2	.08	10	10	10	3
May	67	25	57.7	35.0	46.4	.76	7	14	10	6
June	74	28	50.6	38.0	49.3	1.42	3	7	20	9
July	89	44	70.0	49.2	59.6	3.49	9	3	19	15
August	84	27	64.1	43.0	53.6	1.85	4	8	19	15
September	68	18	52.1	32.6	42.4	2.29	1	8	21	11
October	40	− 2	30.3	17.2	23.8	.96	8	5	18	11
November	34	−36	3.3	− 8.3	− 2.5	1.14	7	7	16	7
December	37	−56	.0	−13.2	− 6.6	1.08	8	7	16	9

VALDEZ. Latitude 61° 7′, longitude 146° 16′. Myrtle F. Billings, observer.

January	37	−14	22.5	11.1	16.8	3.37	5	4	22	19
February	37	− 5	28.1	10.4	19.2	1.48	9	4	15	13
March	43	− 7	31.1	12.4	21.8	.77	15	5	11	8
April	52	20	43.6	28.9	36.2	2.35	10	3	17	16
May	57	28	50.5	33.9	42.2	2.30	12	6	13	15
June	68	39	56.0	42.5	49.2	1.63	11	5	14	9
July	77	42	59.8	45.6	52.7	1.71	8	8	15	16
August	66	32	56.1	43.1	49.6	5.45	5	4	22	21
September	60	30	52.0	38.7	45.4	7.14	6	4	20	20
October	50	24	41.8	31.6	36.7	4.46	8	9	14	16
November	41	6	31.8	19.1	25.4	1.87	13	4	13	8
December	38	− 5	23.1	11.0	17.0	6.59	7	5	19	14

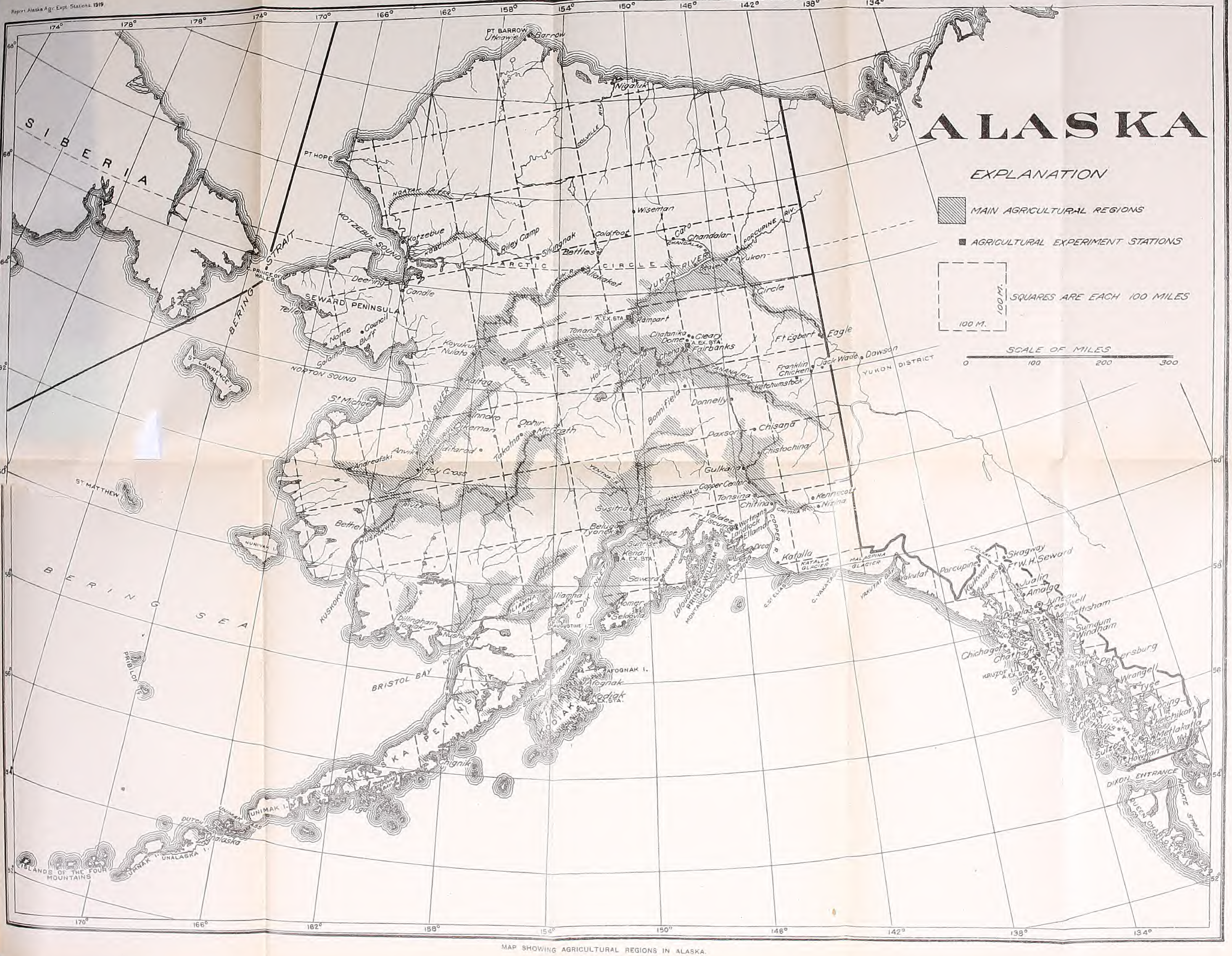
Condensed meteorological reports—Continued.

WRANGELL. Latitude 56° 28′, longitude 132° 23′. J. S. Clark, observer.

Month.	Temperature.					Total precipitation.	Number of days—			
	Maximum.	Minimum.	Mean maximum.	Mean minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1919.	*°F.*	*°F.*	*°F.*	*°F.*	*Inches.*					
January	52	15	38.7	28.3	33.5	12.14	1	11	19	27
February	43	8	35.8	26.3	31.0	4.30	5	8	15	18
March	49	10	37.1	25.1	31.1	5.56	5	12	14	19
April	59	30	50.0	35.5	42.8	4.91	3	8	19	26
May	68	30	56.6	37.7	47.2	4.26	5	13	13	20
June	71	38	60.0	44.1	52.0	1.62	4	6	20	13
July	75	44	64.0	48.9	56.4	4.24	3	10	18	23
August	77	40	64.7	49.4	57.0	6.32	7	4	20	20
September	70	37	61.3	44.5	52.9	6.93	9	5	16	14
October	64	25	49.5	37.9	43.7	7.60	12	1	18	18
November	54	16	37.7	27.3	32.5	7.83	11	2	17	15
December	50	10	35.2	24.5	29.8	8.38	12	0	19	11

YAKUTAT. Latitude 59° 33′, longitude 139° 44′. E. M. Axelson, observer.

January	43	12	33.5	25.0	29.2	14.19	5	1	25	21
February	45	13	35.9	26.5	31.2	6.44	9	2	17	15
March	43	9	35.6	23.9	29.8	4.55	9	6	16	9
April	51	22	44.0	33.2	38.6	7.60	10	1	19	19
May	59	27	50.2	36.1	43.2	3.84	11	12	8	17
June	59	37	53.8	44.1	49.0	3.44	8	8	14	12
July	65	45	57.1	48.5	52.8	7.00	6	12	13	16
August	63	40	57.2	47.3	52.2	7.30	10	6	15	14
September	66	34	54.9	43.0	49.0	15.15	13	2	15	18
October	53	27	45.9	36.5	41.2	9.85	9	1	21	17
November	44	12	36.7	26.3	31.5	10.07	10	3	17	17
December	42	13	34.5	26.1	30.3	14.52	10	2	19	18



MAP SHOWING AGRICULTURAL REGIONS IN ALASKA.